Transition Management

New mode of governance for sustainable development

Transitiemanagement

Nieuwe vorm van governance voor duurzame ontwikkeling

Proefschrift
ter verkrijging van de graad van doctor aan de
Erasmus Universiteit Rotterdam
op gezag van de
rector magnificus
Prof.dr. S.W.J. Lamberts
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op
donderdag 7 juni 2007 om 16.00 uur

door
Derk Albert Loorbach
geboren te Rotterdam

Promotiecommissie

Promotor:
Prof.dr.ir. J. Rotmans

Overige leden:
Prof.dr.ing. G. Teisman
Prof.dr. J. Grin
Prof.dr. M. van Twist

Copromotor:
Dr. R. Kemp

Financially supported by the J.E. Jurriaanse Stichting Rotterdam

ISBN 978 90 5727 057 4
Graphic design and cover: Sandder Lanen
Editing: Liedewij van Tuin
Desk Top Publishing: Hanneke Kossen
Printing: AD Druk

The author can be reached at: loorbach@fsw.eur.nl

International Books, Grifthoek 151, 3514 JK Utrecht, the Netherlands
phone +31 30 2731 840, fax +31 30 2733 614
e-mail: i-books@antenna.nl; website: www.antenna.nl/i-books

US-orders to: IPG books, Order Department, 814 North Franklin Street,
Chicago, IL 60610, e-mail to: frontdesk@ipgbook.com,
or phone tollfree 800-888-4741
UK-orders to: Global Book Marketing/Central Books, 99b Wallis Road,
London, E9 5LN, info@globalbookmarketing.co.uk,
or phone +44 (0)20 8533 5800

Preface

'It's the journey that counts and not the destination', some say. Transitions to a sustainable society are like discovery journeys into the unknown; they are about exploration, learning, discovery and change. Since the destination (what is a sustainable society) is unclear and the roads towards it highly uncertain, the only way forward is to take small steps and regularly evaluate whether we are coming closer to or drifting away from our ideal destination. This metaphor of transitions as journeys can be extended: along the way we will meet challenges, encounter problems, will be surprised by unforeseen changes, will meet new friends and perhaps make enemies, and finally will come up with solutions never before imagined. The journey itself is in this sense the change or discovery we would like to see: by embarking on new pathways to the future, we are already changing the present. However valuable such a zen-like attitude towards change and innovation, at this moment in time I am more than happy to have produced a concrete result and am able to write this preface. Although it is by no means the end of my journey and my final destination, this book sure feels like an important stop along the way and an accomplishment I have been working towards for years. It marks the personal transition I went through and at the same time feels like a new start. Obviously, I have not traveled alone and have been accompanied, supported, guided and diverted by many colleagues, friends and family.

In general, I have been very lucky in finding a scientific environment that was and is interdisciplinary, exciting and innovative. I started out at ICIS, Maastricht. Here, I found a perfect interdisciplinary scientific 'niche' to develop the first ideas on transition management, outside the scientific, political and bureaucratic mainstream. The move to Drift, Rotterdam, marked not only a personal transition but also the next phase in my research where our ideas were increasingly taken seriously while they matured and were scaled up. Besides these institutes with great colleagues, I also have the pleasure to be part of the Dutch Knowledge Network on System Innovations and Transitions (KSI), in which dozens of researchers from all sorts of scientific disciplines interact, cooperate and discuss. The cooperation, debate, joint projects and joint papers that resulted from operating in such a dynamic context laid the basic foundation for my research and perhaps evenly important provided a very stimulating and inspiring environment.

Although I do not want to thank all people who undoubtedly in some way or another contributed to the thoughts put on paper here, I do want to thank three people in specific. First and foremost my promoter, mentor, traveling-guide and -companion Jan Rotmans. When I myself was unsure about my future, you gave me the opportunity to develop myself as researcher (and consultant) at a unique moment in time when the 'transition–field' was largely uncharted. I can never be thankful enough for this opportunity and all the valuable lessons you taught me. I have appreciated greatly our co-production over the past years; much of the ideas in this book stem from our inspirational collaboration. The second person essential to my research has been René Kemp, who I want to thank especially for teaching me the ins and outs of empirical research and scientific writing. Our collaboration in the waste-research project for me was an essential introduction to 'regular' research and an important project in the context of developing the transition management framework. I greatly benefited from your

comments and critique during the writing, but also from your network in which you spread these papers. Third, I want to thank Martin van de Lindt, my partner in crime in the transition arena. I think I can safely say that we together have spent hundreds of hours together in the Parkstad Limburg and Flemish Building and Living transition arena's. Your experience combined with my analytical background provided the necessary mix to develop an implementation of transition management that is practical, do-able and effective. We have had the strangest, most exciting and depressing experiences along the way, and I look forward to new adventures.

Finally, I want to extend my gratitude to family and friends for their support and interest, especially my wife Lidwine and son Abel who helped me to keep things in perspective. Thanks to becoming a father, I realize even more that the future of our world starts today and that we do not only need great ideas and inspiring visions, but also action that starts today. Achieving progressive action and innovation that links up to desired transitions is not only a great challenge, but also a moral obligation and ethical necessity in order to preserve and improve the living qualities we have today. My hopes are that the approach described in this thesis is recognized by scientists and practitioners operating in different fields and sectors of society and at different levels, and offers a coherent, constructive and innovative approach to sustainable development in the broadest sense. If so, the transition management approach could contribute to a more directed and more rapid breakthrough of sustainability and sustainable initiatives emerging worldwide. Whether we want it or not, we are on a journey towards an uncertain future, which we need to turn into a common journey towards sustainability. But for now, I am taking a short pause to contemplate where I want to go next and enjoy the road already traveled and where it has taken me; here it is.

Derk Loorbach
Rotterdam, spring 2007

Contents

Chapter 1

Introduction and research objectives

Although this book is largely inspired by a personal motivation and ambition concerning sustainable development, it is in the first place a scientific exploration of the possibilities for influencing long-term processes of societal change. As our world is constantly changing, the challenge for governance and policy is to deal intelligently with all sorts of processes of change and to redirect and accelerate these processes in a desired direction. This challenge becomes especially important in light of the ambitions for sustainable development. Because our current institutions and policies primarily focus on short- and mid-term goals and problem-solving, the development and implementation of long-term goal seeking governance strategies imply breaking through existing routines, ways of thinking, and physical and mental barriers of individuals. This seems the only way forward to alter the current unsustainable development trajectories of our society towards more sustainable ones. Such fundamental changes at the level of our society (societal transitions) need to be based on a shared sense of urgency, on forceful and inspiring long-term sustainability visions and on societal innovation strategies.

Sustainability, social equality, democracy, quality of life and reflexivity all need to become drivers for societal innovation instead of only economic growth, efficiency increase and continuing specialisation and fragmentation. This means a re-evaluation of the basic values and standards of our society at all levels: how we cooperate, innovate and modernise, our collective awareness and sensitivity towards environmental and societal issues and what values and qualities we want to preserve and develop for the future. Only through cooperation between all sorts of innovators, shared strategies and collective long-term societal goals can we establish the necessary fundamental changes at the level of individuals, organization, communities and ultimately the whole of society. Although influencing the whole of society does seem a daunting and impossible task, this thesis aims to discover new ways to influence processes of change at least partially. Realizing that society can never be controlled in any way, but can indeed be influenced, the only way that we can make progress in terms of sustainable development is to experiment and explore in a structured but flexible way, learning-by-doing and doing-by-learning, and through that process develop sustainably.

To realize a sustainable society it is clear that we are in need of societal innovation: the creative powers of our society need to be utilized to create new societal systems based on innovations in technology, culture, economy, ecology, institutions and society. Such societal transitions are needed at all levels, from global to local, but they are obviously long-term, highly uncertain and disputed processes. Organizing and coordinating such transitions thus poses an enormous and inspiring challenge for our society in general and governance and policy in particular: how to develop sustainably so that we overcome global inequalities, degradation of ecosystems and social and cultural crises and do not end up in crises and conflict? What exactly is sustainable, how should sustainability be organized or managed and at what pace should we transform unsustainable societal systems – these are all issues for debate. What seems undisputed is that sustainable societal innovation requires room for change, creativity and experiment and cannot be controlled or planned. On the other hand, we also know

that sustainable development does not take place autonomously: economic and technological innovations are often much more forceful than innovation in institutions, behaviour or culture.

This thesis aspires to contribute to a more sustainable world by developing a mode of governance that combines the best of both worlds: a balance between structure and spontaneity, between management and self-organization, between long-term ideals and short-term action and between theory and practice. This thesis presents a 'grand idea' and simultaneously 'small scale action': transition management. This term evokes all sorts of reactions, ranging from 'scientific concept' to 'social engineering in disguise' to 'something we already know' and from 'command and control' to 'anything goes'. This thesis sets out to present transition management as a concept of multiple meanings: academic and concrete, new and familiar, top-down and bottom-up. Transition management is presented here as a new mode of governance which provides a framework for a generic (scientific) governance approach and an operational policy model to influence long-term societal change. It builds on existing theories, approaches and models, but also adds new elements and provides through its integration a new paradigm for research and policy practice.

In this thesis we aim to explore and define more precisely what should be understood by these terms in the context of long-term governance for sustainable development and to offer strategies to operationalize or implement transition management. Transition management as presented here, offers the perspective on a form of governance and policy-making fit for a complex network-society that aspires to achieve a sustainable future through far-reaching innovation. This ambition will never be fully achieved because no change is without problems; there will always be outside influences, external costs and effects and problems of scarcity and inequality. We do, however, claim to have taken the first steps on a road towards discovery of new strategies, tools and approaches while simultaneously embedding these innovations in accepted theory and practice and we invite all those interested to join the debate and the quest for finding new ways to realize a more sustainable society. We argue that it is precisely this process of learning-by-doing and doing-by-learning that is at the heart of transition management.

1.1 The need for transition management

Modern society is developing into a network society in which a growing number of problems emerge that seem impossible to solve with traditional approaches and instruments or through existing institutions (Rotmans et al. 2001). The process of modernization in the industrialized world has produced these 'symptoms of unsustainability' as a side-effect of economic development, technological progress and the continuing increase in wealth. Examples of these unsustainability symptoms on a global scale are the over-consumption of natural resources, social and economic inequalities, loss of biodiversity and climate change problems. At a local level, these symptoms may have a very negative and concrete impact on people's lives: flooding, starvation, poor air and water quality, (armed) conflicts and in general a negative impact on welfare, efficiency and development. In the western and industrialized world, the unsustainability symptoms

are much more associated with the industrialized societal systems and their focus on economics and efficiency.

Beside direct environmental impacts, which are more or less 'managed' through environmental policies, manifestations of unsustainability are traffic jams, power shortages, poor food quality, loss of space, pollution etc. These problems of unsustainability can be directly linked to problems at the global scale; the industrialized world has in a sense exported its problems through import of resources and export of environmental load. Beside the local unsustainability problems industrialized countries are experiencing, they also carry the responsibility for problems elsewhere (e.g. Third World countries), now and in the future. Sustainable development and in general a responsible society should therefore be concerned with local problems as well as with global issues and their interrelations. This can only be done by reflecting on the foundations of our society and its development and looking beyond the perceived symptoms. We use the term 'symptoms' because they form the signals of how our society and its structures have developed and are organized. Driven by technological, economic and social progress, the industrialized world has developed a culture, supporting structures and individual practices that together form social systems with high adverse environmental and social impacts – not only a profound impact in and on our own society, but on an increasingly global scale. These perverse effects of modernization challenge our society to try to deal with these problems effectively so that our society will be able to make the transition to a sustainable society in which negative impacts elsewhere and in the future are minimized or largely reduced. Such a form of reflexive modernization (Beck 1994) needs to be translated to fundamentally new practices, structures and culture.

In studying transitions to sustainable development, the focus in this thesis is on industrialized economies with the Netherlands in the European context as example. The Dutch society is a modern, highly developed and egalitarian society. It is a country with a relatively high population density, an effective bureaucracy and a democratic political culture. It is in a development stage similar to many Western European countries: population growth is stagnating after a period of wealth and population growth. The dominant paradigm of efficiency, growth and globalization is increasingly challenged by alternative visions and ideas on all sides of the political and social spectrum and by a growing dissatisfaction with the functioning of our societal systems (e.g. energy, agriculture, health-care, education, housing-and-building, spatial planning and mobility). The problems of unsustainability our society is faced with, are characterized by large complexity, high uncertainty, many actors involved with different perspectives and values (Dirven et al. 2002). The way our societal systems are organized can be considered to be unsustainable from a long-term perspective: there are only limited resources, there is limited space, the economic feasibility is under pressure or there are not any possibilities for growth anymore. It is clear that in the long-term these systems will need to go through structural change in order to achieve better levels of performance and solve the unsustainability problems we are now facing. This can not only be considered to be a necessity for survival but it can also be seen as a desirable and ethical next step in human evolution: to organize our society in such a way that it is more in balance with our natural environment, based on principles of democracy, equity and justice. These issues cannot be resolved through traditional approaches

and processes, because they are so deeply embedded into the structures of our society. The fundamental question is obviously how the major transitions that are necessary could unfold; perhaps an even more interesting question is where they should lead to.

The future development of our society is an area of continuing battle through debate: between progressive and neo-conservative, between globalist and anti-globalist, between environmentalist and liberalist, between democratic and authoritarian forces and movements. Different actors perceive the contemporary problems of this world so differently that any form of agreement on solutions is virtually absent. Whether the topic is climate change, development aid or even the best strategy to combat pollution, fundamental differences in goals, interests and strategy often prevent cooperation, consensus or shared solutions. This type of problems is often called 'wicked' (Rittel and Webber 1973) or 'unstructured' (Hisschemöller and Hoppe 1996) in the literature, referring to the fact the different actors define these problems differently. However besides being defined and perceived differently by different actors, the problems of sustainability also originate from patterns of thinking and acting that have rooted deeply within existing institutions and structures. Ultimately this means that they can not be solved by traditional means and approaches. We therefore use the term 'persistent problems' as a specific type of unstructured problems. By using a complex systems perspective, we can define the deeper-lying roots of such problems, and thereby explain the reasons why they are so difficult to deal with. These reasons are: that they occur (differently) on different levels of scale; that a variety of actors with different perspectives is involved; that they are highly uncertain in terms of future developments; that they can only be dealt with on the long term; that they are hard to 'manage' in a traditional sense; that they are rooted in different societal domains. Persistent problems can be seen in sectors such as agriculture, mobility, housing and energy-supply and water management. In order to properly address the complexity of the processes of change needed in these sectors, new policy- or governance-approaches need to be developed which take into account the inherent conflicts of interest, opinion and value. These new governance approaches will have to start from the complexity, interdependency and uncertainty that are characteristic of our society.

The diversity of perspectives on what a persistent problem is and what solution is preferred, can be understood when one takes into account that single actors only see parts of the whole society. Their perspective depends on their own history, roles, interests, knowledge, activities and so on but also on their specific place in a system, the level of scale they operate at and the time-horizon they work upon. We will try to illustrate this with a simple example of the Dutch agricultural sector. At the local level a single farmer is concerned with taking care of his family and will therefore be mostly focused on the harvest and purchase. The problem of unsustainable agriculture to the farmer is first of all individual economic survival. At the societal level there are policy makers, interest groups and NGOs that are occupied with pushing issues to the political arena, changing regulation and developing new financial and regulatory schemes by debating and negotiating with other actors. At this level, environmental issues and animal well-being are among the subjects of debate, related to development and implementation of policy measures. This is a totally different problem framing than that of the farmer. At the systems level we observe the decreasing space for

agriculture due to housing, water management and international competition. A decrease in agricultural production leads to a dependency on foreign food supply and to vulnerability on a national level. Here the question is whether agricultural activities have a role to play at all in the future or if we should make ourselves dependent on import of agricultural products and for example focus on specialized agricultural knowledge and technology for export. Hence, at this level, the problem perception is again quite different. At these different levels, different actors operate who hold perspectives that are often conflicting (in this case one could think about environmental movements, local residents, project developers, lobby groups etc.), which adds even more to the complexity. A debate on the future of the agricultural sector in the Netherlands can therefore be very different at different levels and from different perspectives. Because an overall framework or perspective is lacking, there is no debate about 'the (sustainable) future of agriculture' but there are only rather fragmented debates on new regulations, specific locations or practices, European policies etc. What is lacking in the context of such persistent problems in societal systems, is integration, coherence and systemic thinking. The example illustrates that persistent problems manifest themselves differently at different levels of scale, different actors with different problem perceptions are involved, different speeds of societal change intertwine and different solutions are offered at different levels. In practice, actors are increasingly interacting with other actors at the same and other levels. The traditional policy process is structured so that the government directs this process and involves stakeholders to develop policies. However, these are the outcome of negotiations and consensus and therefore almost never long-term policies for radical innovation. Although such complex issues could partly be dealt with by using 'regular' approaches and instruments, they require new governance approaches that also take into account the overall systemic dynamics and the associated complexity.

We can support the argument for new approaches by building on Hisschemöllers policy problem-typology (Hisschemöller 1993). This typology distinguishes between four different types of policy problems, which are mapped out in two dimensions; the amount of consensus or dissent on relevant standards and values (relating to the nature of the problem) and in the other dimension the amount of certainty about the kind of knowledge required (relating also to solutions). In this spectrum, simple problems are problems for which solutions are given, while at the other end complex problems are characterized by structural uncertainty and dissent. Problems of unsustainability are problems of the latter category and are by definition about different perspectives, unknown solutions and the absence of consensus on the nature of the problem. Besides participatory processes in which convergence or consensus is sought (in case of unstructured problems), for persistent problems a more fundamental reflection upon dominant values and perspectives is necessary in order to achieve breakthroughs in thinking that enable transition processes. The strength of such a problem typology is that different categories of problems can be linked to different solution strategies or decision making- and policy process. While simple problems require technical solutions (for example building a bridge), complex and unstructured problems require social learning processes (see Table 1.1). This perspective on societal issues relates well to the changes in policy thinking over the last decade and sociological observations regarding societal structures. In both areas thinking is

more and more dominated by the concept of 'networks'; pluriform, multi-actor systems for which interdependency, self-organization and the absence of overall control are characteristic. However, not all problems that are simple have been solved; it is rather our perception of and perspective on reality that has evolved, making it possible to break down complex problems into 'simpler' problems at a lower level of scale. This process of breaking down problems is at the heart of problem-structuring where complex problems are split up into sub-problems for which more specified approaches and policy processes are effective.

Problem/Solution	**Simple**	→		**Complex**
Type of approach	Technical	Market	Stakeholder	Governance
Decision making	Expert elite	Cost-benefit analyses	Consensus building	Diffuse
Policy process	Regulation	Negotiation	Pacification	Learning

Table 1.1 Typology of societal problems and strategies (based on: (Hisschemöller 1993; Dirven et al. 2002))

Although real life problems are not simply put in only one category, the typology makes clear a gradient of complexity and accordingly the need for a portfolio of policy instruments and approaches that are related to the nature of the problem. Because of the increasing societal complexity, increasingly complex problems are perceived and increasingly complex policy processes are needed. Our society, however, has been organized hierarchically and in sectors or (policy) domains based on the idea that societal problems can in fact be managed in a top-down and linear fashion by excluding uncertainties and surprises (which is often the case with simpler problems). The current institutions and organizations (governmental as well as industrial, scientific and non-governmental), both in institutional design and in their practices, are not equipped to deal with complexity and uncertainty. From this point of view our society is currently in a lock-in: institutional structures, socio-technical regimes and certain routines and behaviour that stem from decades of technological-economic fixation on growth, specialisation and efficiency are deeply rooted in our society. Problem solving has often been reduced to short-term approaches directed to narrowly defined problems that amount to only incremental and gradual changes. There is not much room for structural change as long as the dominant institutions and structures persist. The current path of development is that of optimization of existing structures instead of innovation and creation of new structures. However, it might theoretically even be so that because of the ongoing reproduction of existing structures, it becomes increasingly harder to achieve sustainable, structural change on the long term. Conceivably, breakthroughs of different kinds (technological, institutional, behavioural, cultural and other) are needed to deal effectively with the problems of unsustainability in the long term. This requires a fundamentally different way of dealing with social change and the role of governance herein. As Einstein already said: *we can't solve problems by using the same kind of thinking we used when we created them.*

1.2 Transitions and transition theory

In order to transcend our current way of thinking and escape the lock-in, structural changes are needed at the level of our societal systems: transitions. Transitions are transformation processes in which existing structures, institutions, culture and practices are broken down and new ones are established. Societal transitions are defined as processes of change that structurally alter the culture, structure and practices of a societal system. These processes take a very long time to materialize (1-2 generations) at the level of a societal system, although partial processes (for example fundamental changes in thinking or radical innovation) can occur almost overnight. A societal transition results from interacting changes in all societal domains (e.g. economy, ecology, institutions, technology and welfare). Transitions as a phenomenon have been studied within several disciplines. Originally, the term transition was used to describe the 'phase transitions' of substances going from solid to liquid to gas, but since then the concept has been applied to a wide variety of different types of systems to describe shifts between qualitatively different states. The shift is not a linear but a chaotic and non-linear process of change. This model is called 'punctuated equilibrium' (Eldredge and Gould 1972; Gould and Eldredge 1977) and has been applied in ecology, psychology, technology studies, economics and demography (Gersick 1991). The sociological concept of transition has its roots in population dynamics. Davis (Davis 1945) describes the demographic transition in which initially both birth and death rates are relatively high. Via a non-linear drop in birth and death rates a new stable situation is reached with a relatively low birth and death rate. Rotmans, Kemp and others (Rotmans et al. 2000; Rotmans et al. 2001; Rotmans and Loorbach 2001) have introduced the transition concept in the field of sustainable development, governance and policy. Their basic hypothesis was that through the understanding of structural societal change processes (like transitions), it must be possible to formulate governance principles, methods and tools to deal with these processes (i.e. transition management). Their work laid the foundation for the new field of 'transition studies' (Rotmans et al. 2004).

In this new research field transition processes are studied from a variety of system-perspectives: socio-technical systems (Schot and Rip 1997; Kemp et al. 1998; Geels 2002; Berkhout et al. 2004), innovation systems (Smits and Kuhlmann 2004) and complex adaptive systems (Rotmans et al. 2001; Loorbach 2004; De Haan 2006; Van der Brugge 2006). Between the different systems perspectives on transitions, there are a number of basic commonalities: (I) the systems that are studied are open and embedded in an outside environment with which it coevolves, (II) there is a changing outside environment that influences the system and (III) the system itself exhibits non-linear behaviour in order to adapt to its environment. This process of adaptation takes place by means of changing the system structure. Under certain circumstances, the environment and the system are so far out of tune that a gradual adaptation is no longer sufficient and the systemic structure rapidly loses its effectiveness. Crises that undermine the dominant structure occur in the system, until a turning point is reached. Then through a transformation period a new structure emerges. According to Gersick, who analyzed the use of this so called 'punctuated equilibrium' model in different research areas, disruption of the dynamic equilibrium of a system in general has two sources: internal changes that pull parts and actions out of alignment

with each other or the environment, and environmental changes that threaten the system's ability to obtain resources (Gersick 1991). This view on systemic change hints at the emerging field of complexity science and is a shared hypothesis underlying transition research.

Transitions are only one of the many pathways of change a system can pass through. We define a transition as a continuous process of societal change, whereby the structure of society (or a subsystem of society) changes fundamentally. This societal transformation process has the following characteristics (Rotmans et al. 2000):

- It concerns large scale technological, economical, ecological, socio-cultural and institutional developments that influence and reinforce each other;
- It is a long term process that covers at least one generation (25 years);
- There are interactions between different scale levels (niche, regime, landscape).

Hence, a transition is a process of structural societal change from one relatively stable system state to another via a co-evolution of markets, networks, institutions, technologies, policies, individual behaviour and autonomous trends. The complexity of a transition implies that it has a multitude of driving factors and impacts. A transition can be accelerated by one-time events, such as large accidents (e.g. Chernobyl, 9-11) or a crisis (such as the oil crisis) but is not caused by such events only. Slow changes in the external environment determine the undercurrent for a fundamental change; superimposed on this undercurrent are events such as calamities, which may accelerate the transformation process. Transitions thus are multi-causal, multi-level, multi-domain, multi-actor and multi-phase processes.

In order to structure such complex processes and be able to analyze transitions as a basis for governance, general patterns of complex systems dynamics are taken as a starting point. Instead of focusing on the chaotic, unpredictable and uncertain patterns of change within complex systems, common elements are used as a point of departure for analysis. The transition theory is built on two main analytical concepts: multi-phase and multi-level. These concepts are closely related and both concepts combined help to analyze both the temporal dimension and the underlying dynamics of transitions. Combined with the systems approach, these two concepts enable the rough analysis of any societal system in terms of the system state and the possibilities for structural change. Transition management is an intrinsic part of transition theory as it conceptualizes the role of agency in transitions and can be used to analyze possibilities for influencing. Transition management therefore necessarily builds on an understanding of transitions from a complex system perspective as basis for development of governance strategies.

The multi-phase and multi-level perspective on transitions

Although transitions are characterized by non-linear behaviour, the process itself is a gradual one (Rotmans et al. 2001). Transitions can be described in terms of 'degradation' and 'breakdown', versus 'build up' and 'innovation' (Gunderson and Holling 2002) or in terms of 'creative destruction' (Schumpeter 1934). The central assumption is that societal structures go through long periods of relative stability and optimization, followed by relatively short periods of structural change. In this process, existing structures (values, institutions, regulations,

markets etc.) fade away while new ones emerge. Historical analyses of societal transitions (Verbong 2000; Geels 2002; Loorbach et al. 2003; Van der Brugge 2006) suggest that transitions go through different stages (Rotmans et al. 2000). Four phases are currently distinguished, represented by an S-shaped-curve. The nature and speed of change differ in each of the transition stages:

- In the predevelopment phase, there is very little visible change on the societal level but there is a lot of experimentation
- In the take-off phase, the process of change gets under way and the state of the system begins to shift.
- In the acceleration phase, structural changes take place in a visible way through an accumulation of socio-cultural, economic, ecological and institutional changes that react to each other; during this phase, there are collective learning processes, diffusion and embedding processes.
- In the stabilization phase, the speed of societal change decreases and a new dynamic equilibrium is reached.

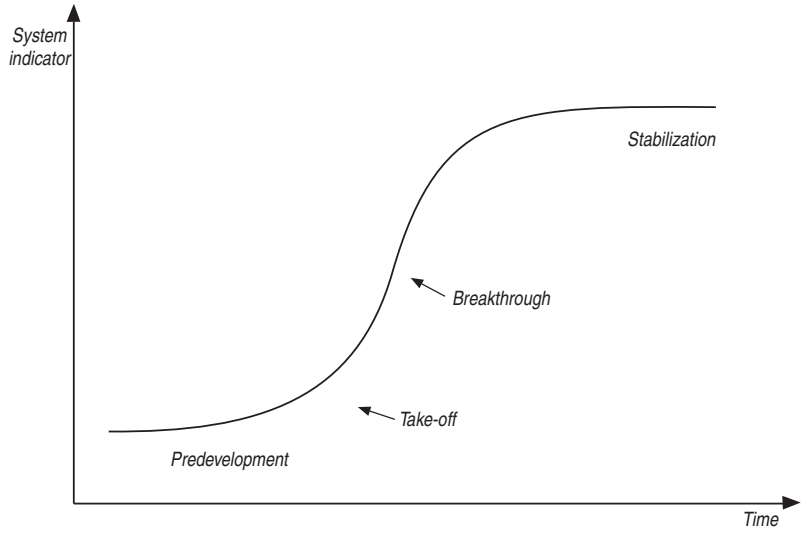


Figure 1.1 Four phases of transition

The S-shaped curve is a highly simplified model to represent such a complex process as a transition. Behind the smooth S-curve, multiple and interrelated innovations take place at a different speed and level. In systemic terms, transitions are the result of interacting system innovations (at the level of sub-systems), which in their turn result from (product- and process-) innovations. For example, the transition in Eastern European countries consists of interrelated innovations in their institutional, economic, socio-cultural and technological systems, while these can only come about as the result of new regulations, organizations, infrastructures, etc. 'Transition' is thus a collective term referring to a wide range of interconnected innovations at different levels, which is called a 'cascade of innovations' (Rotmans 2005). The S-shaped-curve therefore is not so

much a model that predicts for example changes from one phase to the other as it is a conceptual (descriptive) model to reflect upon possible dynamics of a societal system and possible future trajectories. The central message of the S-curve is that structural change is not a gradual, linear process and that in the longer term structural change is to be expected under certain circumstances. This message underlines the need for conceptual, cognitive and operational approaches that are able to deal with non-linearity and unpredictability.

So qualitatively different phases in transitions are caused by multiple changes at different levels. In analyzing societal systems we need to take into account the system as a whole itself and the system in its environment. We also need to take into account the dominant structure of the societal system (the regime) and deviating elements. The multilevel model (see Figure 1.2), originating from innovation and technology studies (Rip and Kemp 1998; Geels and Kemp 2000; Geels 2002), is taken as point of departure. The central level is the meso level at which the so-called regime is located. The term 'regime' refers to the dominant culture, structure and practice embodied by physical and immaterial infrastructures (for example roads, power grids, but also routines, actor-networks, power-relationships, regulations). These institutionalized structures give a societal system stability and guide decision-making and individual behaviour of actors. At the same time, the regime has a certain level of rigidity that normally prevents innovations from altering the structure fundamentally. The second level is the micro-level of innovations; inside so-called 'niches' novelties are created, tested and diffused. Such novelties can be new technologies, new rules and legislation, new organizations or even new projects, concepts or ideas. The third level is the landscape, the overall societal setting in which processes of change occur. The landscape consists of the social values, political cultures, built environment (factories, etc.) and economic development and trends. The landscape level typically develops autonomously but directly influences the regime level as well as the niches by defining the room and direction for change.

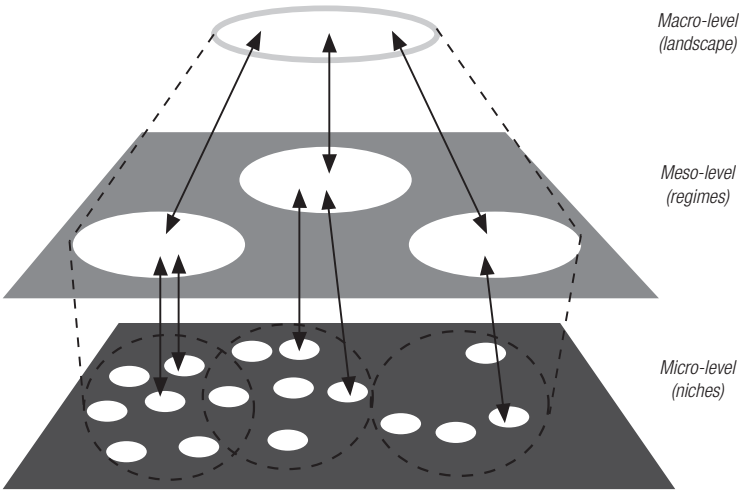


Figure 1.2 Interaction between different scale-levels (Geels and Kemp, 2000)

For a transition theory based on the complex adaptive systems perspective, the multi-level model, which has been developed to study socio-technical regimes, is not sufficient. It combines qualitatively different levels within one model and thereby does not allow for analysis of external forces or complex system dynamics. Regimes and niches are similar structures, although of a different level of aggregation. Between these two levels, competition takes place. The landscape level, as defined by Kemp, Geels and others, is seen as the external environment where all those developments are situated that are not considered to be part of the regime or niche level. These could be cultural, political or economic trends, but also cultural or political surprises. From a complex systems perspective, the dynamics of a societal system are determined by their internal interaction (regimes, niches, co-evolution) and the interaction between the system and its environment. An analytical model to analyze societal systems as complex adaptive systems must therefore be able to distinguish between system-internal, system-specific and system-external developments. It is thus the level of a specific societal system that is at the heart of the analysis, like the energy system, the mobility system, the food production and consumption system, etc.

Building on the multi-level model, a complex, adaptive systems model should include dominant structures (of elements and their interrelations) and deviating elements. Furthermore, it should include an external environment and finally a systems level (in fact the central level of analysis, but also object of analysis at the same time). At the system level the dynamics are observed which result from the interaction between the internal system dynamics and developments in the system environment and define the characteristics and dynamics of the system as a whole. A complex, adaptive systems model thus should be able to discriminate between at least four levels instead of three (see Figure 1.3):

- The external environment (macro landscape)
- The societal system
- The regime(s) (meso)
- Niches (micro)

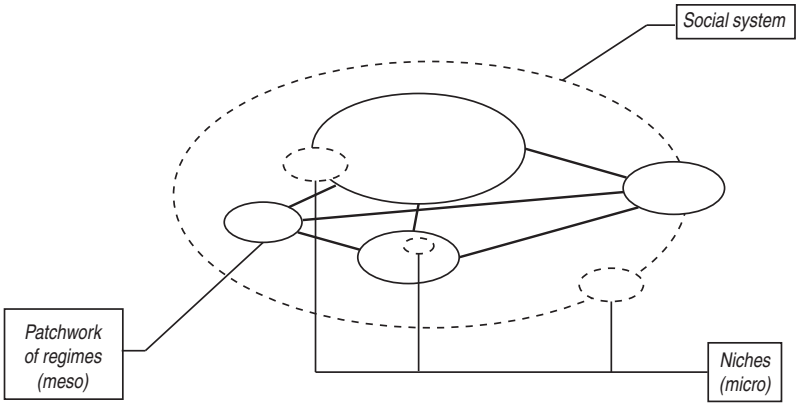


Figure 1.3 Complex systems model based on the MLP

Obviously, the number of levels is not fixed; in between the levels there could be other levels defined, for example niche-regimes as mini-systems between micro- and meso-level. However, these four levels from a complex systems perspective are relevant and they are also functional for transition management, as we will see in Chapters 4, 5 and 6. A complex adaptive systems model should consider its dominant structure to be a patchwork of regimes (or: sub-systems), rather than one regime. This enables the analysis of multiple regimes in which (sub-)transitions take place at different speeds and at different moments in time. Niches can finally be considered to be innovation spaces within which innovations can mature and from there diffuse into the regime. In a complex systems view, niches can be part of the regime, exist outside the regime or even (partly) outside the system.

An adaptation of the multi-level model is primarily necessitated by its use for analysis of societal systems and its subsequent use in a participatory context. A complex systems model allows for a distinction between external trends and developments and system specific development in terms of dynamics at the system level. It also forces the analysts to define the boundaries of a system more clearly. Moreover, it finally provides a more flexible framework for analysis in general because it carries in itself the steps for analysis without prescribing the actual substance. Thinking in terms of systems first implies that the boundaries of a system are agreed upon, and then the dominant regime and its sub-regimes are defined as well as the niches and innovations. Finally trends and developments in the system environment are defined and system relevant trends are distinguished.

It must be clear that any model to analyze societal systems is subjective, the more so because these systems do not exist as such. The transition model is no exception. The fundamental question is which models are useful for what purpose. 'A societal system' does not exist in reality, nor does a 'regime'. We should therefore clearly state that any analysis of a system is arbitrary and only valid as long as it is supported or recognized by actors that operate within it. In other words, a system definition is product of social construction and any model for analysis should be supporting this process. The concepts of transition theory should therefore not be regarded as goals, but as means for analysis. Possibly, there are many alternative system-, scale- or phase-models that could be of as much use. However, in its short existence, transition theory has proved to be of value for integrative, long term analysis of complex societal processes, and has presented a promising starting point for redefining governance in the context of these transitions. Besides the conceptual challenge of understanding the phenomena of transitions and transition management, this research field presents itself as a new area for explorative research closely linked to innovative practice. The objective of transition research therefore is not to achieve objective analysis, but to develop coherent, integrative and long-term analytical tools that provide a basis for societal debate, policy and reflection on future development. Transition analysis should stimulate and support the necessary problem structuring processes, reflexive capacity and social learning that create the conditions for change to occur.

1.3 Sustainable development

Since the late 1980s, many countries have committed themselves to sustainable development but they are struggling with implementation how to do this. Following the Brundtland report *Our Common Future* (WCED 1987), sustainable development came to be defined as redirection of social development in ways that combine economic wealth, environmental protection with social cohesion. In this report, sustainable development was defined as a development that meets the needs of the current generation, without compromising the needs of future generations (WCED 1987). This definition is normative since future generations should have the same possibilities, it is subjective since it requires an assessment of what these future needs are, and it is also ambiguous since these future needs are determined by cultural, ecological and economic developments that can be weighted in more than one way (Matthews 1997; Rotmans 2002). However, we can define some basic characteristics that are attributed to the concept of sustainable development which occur in almost all definitions. The first is that sustainability is an intergenerational phenomenon. This means that a long-time horizon, at least one or two generations (25-50), has to be considered. The second characteristic is the importance of scale. Sustainability occurs at different levels; local or regional sustainability does not necessarily mean national or global sustainability and vice versa. Sustainability analysis thus requires a multitude of scale levels. The third commonality is the different domains that have to be considered in sustainability. Sustainability encompasses a certain context-specific balance between ecological, economic and socio-cultural values and stakes (Rotmans 1994; Pezzoli 1997; Jansen 2003). In short: sustainable development is a complex long term, multi-level, multi-actor process. The call for sustainable development from a transitions perspective is a plea to transform societal systems that struggle with complex and persistent problems structurally. Since regular and traditional solutions result in optimization of existing structures, fundamental and innovative approaches are needed. A link between transitions and sustainable development therefore speaks for itself, although so far they have been rarely coupled.

Sustainable development becomes rather complex when one tries to operationalize it in terms of governance strategies. After the initial optimism during the 1990s about win-win opportunities, it is increasingly understood that there are trade-offs between different values and interests in any type of development (at least in the short term) and that each development raises new problems for society. Sustainable development should therefore be considered as a continuous process in which these values and interests are discussed, negotiated and balanced. This means that sustainability in itself can never be defined objectively beforehand, but that process-conditions and contextual factors can be formulated which ensure an equal representation, pluriform debate and informed discussion. Approaching sustainable development as a continuous process of change means that it cannot be translated into a blueprint or a defined end state from which criteria could be derived and unambiguous decisions are taken to get there. Rather, it is a multi-dimensional, dynamic and plural concept that can neither be translated into the narrow terms of static optimization nor be conducive to strategies based on direct control, fixed goals and predictability (Rammel et al. 2004). As Meadowcroft phrases this perspective: “each generation must take

up the challenge anew, determining in what directions their development objectives lie, what constitutes the boundaries of the environmentally possible and the environmentally desirable, and what is their understanding of the requirements of social justice" (Meadowcroft 1997 37).

At the international level there is a consensus on the need for sustainable development and key areas in which over the next decade significant progress needs to be made: poverty, hunger, health, education, life expectancy, environmental sustainability and global partnerships (UN 2005). The majority of these problems directly relate to third world countries and indirectly to the industrialized world and their economic structures that are often based on cheap labour, resources. The approach to sustainable development adopted by the UN is to realize overall consensus while allowing for a variation of strategies and solutions to be chosen by individual countries, regions and actors at different levels (UN 2005). This means that in practice different countries have taken up different strategies to cope with the challenge of 'managing' sustainable development. A lot of countries opted for sustainability councils and the development of sustainability indicators. In this context, sustainable development has been represented as the intersection of economic, social and environmental agendas and the need to integrate (predominantly) environmental concerns into regular policies. This, however, reflects a fragmented view of reality, and in practice different actors have highlighted any of the aspects according to their own interests. Arguably, sustainable development as a broad notion of an integrative and balanced, yet flexible societal development should be used as guiding principle for future oriented governance in general and not only as a 'measurable' and quantifiable objective (Grosskurth and Rotmans 2007). This means that the challenge of sustainable development can be formulated in terms of the quality and the characteristics of a continuous governance process that enables representation of various perspectives, values and interests and creates space for experimentation, innovation and learning. Perhaps this can be considered to be the next phase in the modernization process in the industrialized world: a reflexive modernization (Beck 1994) process in which current societal systems are re-evaluated and reinvented through innovative processes of anticipation and adaptation. This would require a fundamental shift in thinking about the process of social development and accordingly a fundamental change in the way that this process is organized.

The current systems of governance are not sufficiently able to facilitate such a process: in existing policy and governance frameworks traditional instruments are used for sustainable development. Sustainable development is taken up in the context of regular policies as a separate subject, perhaps as part of the environmental agenda. However, through the establishment of for example new organizations, sustainability programmes or sustainability debates, sustainable development remains in a (environmental) niche, without leading to the much desired and needed shift in government and governance in general. The real challenge therefore is to develop a generic form of governance based on sustainability principles that can be applied in the context of all long-term social issues without a prescriptive or dogmatic substance. The goal of transition management is to enable, facilitate and guide transitions to sustainability (Loorbach 2002; Kemp and Loorbach 2003). It tries to do so through structuration of governance processes based on principles of complexity, transition and sustainability.

Transition management focuses on so-called persistent problems: problems in which multiple actors and perspectives are involved, that are rooted in different societal domains and levels and that are uncertain and contested in terms of problem definition, solution strategy and future development. In such a context, the best possible way forward is that of goal-oriented incrementalism: a directed search-and-learning process. Transition management uses the concept of sustainable development as a normative frame to develop the future orientation (vision) and to structure and organize the search-and-learning process. In doing so it tries to deal with the inherent complexity of the modern society and its associated problems.

Transition management by necessity needs to find different and innovative ways and means to facilitate the envisaged processes and build up the desired governance systems that can generate more sustainable societal patterns. Many current societal systems are locked-in and existing systems and models of governance seem unable to generate the necessary innovative capacity to break through the existing unsustainable systems. This thesis is dedicated to developing a theory and practice for transition management that does justice to the general ambition of creating a system of governance for sustainability and simultaneously establishing a policy-model that translates the theory to every-day practice.

1.4 Research objectives and thesis structure

This thesis presents a new governance approach and model. These are the result of a process of doing-by-learning and learning-by-doing in interaction with a diversity of researchers, practitioners, policy-makers and colleagues. The result of this process has emerged; it was not planned in advance but evolved and took shape during the last four years. There was no clearly defined research plan, or even a specific research question; only the basic and abstract idea of transition management as a new approach for governance and policy-making. The basic question that guided my research therefore can be formulated (in hindsight) as follows:

> How may we elaborate, underpin and implement the idea of transition management, taking into account (recent) insights from complexity theory, sociology, political science and governance studies; and what further refinements, adaptations and additions do practical experiences suggest?

This central question can be specified in a number of sub-questions:

A Is it possible to formulate an interdisciplinary, coherent and scientifically grounded theoretical approach to dealing with long-term societal change which is rooted in complexity science, sociology and governance studies?
B How could we use the theoretical, complexity-based, governance approach as a conceptual basis for implementation?
C Can a conceptual model for managing transitions also be used to analyze historic transition management?
D Is it possible to develop an operational policy model based on the theoretical approach that when implemented leads to significantly more innovative and sustainable outcomes?

E Does experimental implementation of an operational model for transition management lead to adjustments, additions and adaptations in the theoretical approach?

Without having a specific idea or goal in mind, the research evolved quite naturally along two tracks: further developing the theoretical and conceptual idea of transition management and simultaneously implementing and developing methodologies for actually managing transition (policy) processes. The transition management approach has been developed as an integrative scientific approach in itself that could provide a source of inspiration for existing disciplinary approaches, such as business, management and organizational sciences, psychology, environmental science, history and even philosophy or evolutionary economics. The transition management model has been co-produced with a number of government, NGO and business officials in an explorative way, with the collective aim of realizing significant and lasting changes in practice. The chapters describing ongoing transition management processes and projects (Chapters 7, 8, 9 and Intermezzo II) take account of these explorations, while the chapters dealing with the transition management approach present the scientific evaluation of and reflection upon this transition management practice (Chapters 3, 4 and 5). Chapter 6 is a linking chapter in which the transition management model is presented as a scientifically underpinned governance model based on a combination of theoretical and practical knowledge.

The results of this iterative process are in this thesis:
- A theoretical grounding of transition management in complex systems theory, sociological theory and governance theory
- A conceptualization of the approach of transition management and how it relates to the field of governance
- A conceptual framework for analyzing and structuring transition management activities
- A robust methodology for facilitating and managing transition arenas

During the research, 'complexity' emerged as the central theme for my research. Complexity and complex systems theory are a relatively new paradigm in science. Over the last five decades, a rapid development of the integrated research field 'complexity studies' has penetrated different scientific disciplines, ranging from natural sciences to sociological, organizational and management sciences. Complexity studies have evolved from the discovery of complexity as a research paradigm, via mathematically driven quantitative and technical approaches to present-day qualitative approaches based on the dynamics of complex, adaptive systems. By using a complex, adaptive systems perspective, it is possible to understand and describe complex processes such as transitions, but also to reflect and hypothesize upon possible ways for dealing with the perceived complexity.

The central question motivating the research presented is therefore whether it is possible to develop an integrated theoretical governance approach and operational model based on the concept of transitions as structural changes in complex societal systems. This question is based on the assumption that the concept of transitions provides an integrative framework to analyze and understand processes of societal change. This is based on a complex adaptive systems approach

that integrates thinking in levels of scale, in long- and short-term, in certainties and uncertainties, in chaos and order and in emergence and planning. Thinking in terms of transitions automatically leads to a redefinition of the role of policy and governance as integrative processes; they need to support the emergent and planned processes in society towards shared and desired futures through creating room and regulation at the same time.

Transition management is positioned as an approach to achieve such an integrative, co-evolutionary process, but is not yet firmly grounded within the field of policy and governance sciences and has only been implemented and tested on a limited scale. The object of this thesis is to achieve both theoretical and empirical grounding for transition management. In the research process leading up to this thesis, research and practice have therefore constantly been followed through at the same time. It was a deductive process of formulating generic governance principles based on theoretical insights and an inductive process of formulating prescriptive policy models and instruments based on practical experiences. The research process was thus a co-evolution between theory and practice. In this sense, writing this thesis did no justice to the iterative and cyclical research process: the form of a book forces one to think in a linear mode. In addition, the academic thesis forces one even further into a traditional form: one part theory, one part empiricism and one part evaluation. Although I already deviated slightly from the traditional form, I could not write a cyclical book that could be read forward and backward. However, I can suggest different points of departure depending on the interests of the reader. In that sense, it is up to you where you start from: theory or practice (see also Figure 2.1).

In Chapter 2, the methodological approach and methods behind my research process are presented and the cyclical and iterative research approach is underpinned. This chapter is of general interest since it addresses the new style of research that is necessary to combine fundamental with applied research. Chapters 3, 4 and 5 are theoretical chapters in which we have deduced general notions and insights from theory that are relevant for governance and policy-making. In Chapter 3 the theoretical basis for complexity governance is formulated based on a literature overview of complexity sciences, sociology and governance. A generic theoretical basis is formulated for governance in a complex society. In Chapter 4, the approach of transition management is characterized and positioned in the field of governance. Transition management is presented as a new mode of governance based on complexity thinking but with the explicit aim of redirecting and accelerating transitions to a more sustainable society. In Chapter 5 we present the governance framework for transition management that is the basis for the operational model. This framework consists of three levels of governance and a cyclical policy process model. It offers a theoretically underpinned basis for reflecting upon existing policy approaches and instruments and for developing new ones.

Chapters 7, 8 and 9 contain the case studies and present the inductive insights or lessons learned from practice. It is preceded by Intermezzo I that describes how transition management was defined in (Rotmans et al. 2000; Rotmans et al. 2001) and adopted by national policy after a decade of developments in science and policy related to innovation, sustainability and governance. Chapter 8 presents the envisioning project Parkstad Limburg, the first integral transition arena project. In this project we experimented with initial ideas for actually

managing transition arenas by actually managing and structuring the whole process. As such it has provided a context in which many lessons were learned regarding the possibilities and barriers for transition management and the transition arena. In Chapter 9, the energy transition approach of the Dutch Ministry of Economic Affairs is discussed in detail. This process was more loosely based on the initial ideas behind transition management, and provided the ideal context for reflecting and analyzing transition management more distantly. Chapter 7 deals with the historical transition in Dutch waste management. It was studied as part of a scientific project in which a historical transition was studied with the emphasis on transition management activities *avant-la-lettre*. From this case study, the theoretical transition management approach was enriched and the transition management framework developed. In Intermezzo II we shortly describe the TA on sustainable housing and living in Flanders. This was the first experiment with the TA outside the Netherlands and second full-scale TA-project after Parkstad Limburg.

Chapter 6 is the central chapter in this thesis, as it presents the transition arena model as a result of theoretical arguments and considerations and practical experience and lessons. The theoretical basis was deduced from theoretical insights, identification of generic patterns and mechanisms and analytical generalization. Based on these preliminary assumptions, tentative prescriptive rules were formulated and put into practice. Our practical experiences in turn influenced our theoretical ideas and insights. Finally, Chapter 10 synthesizes the insights and lessons learned during my research. It does not draw final conclusions, as transition management remains a work in progress and only intermediary conclusions can be formulated (these are part of the different chapters). It does however provide insight into newly emerging themes for transition management research and practice and sketches a scientific and societal agenda.

Chapter 2

Transition research: approach and methodology

'Transition research' is the term used to describe research on transitions and transition management as currently done from different scientific disciplines in the Netherlands (Rotmans et al. 2004). Research on transition management and sustainable development seems almost impossible from a traditional, mono-disciplinary perspective. Transitions are defined as all-encompassing transformation processes that can only be properly analyzed in hindsight. Transition management for sustainable development is in essence more an idea than an empirical fact or a hypothesis that can be empirically tested and validated. Although we can identify elements of transition management in historical transitions, and hypothesize upon what transition management could be and how we could actually operationalize it, it seems impossible to formulate straightforward hypotheses to be tested through case studies or literature research alone. The nature of this research was to explore and underpin a new governance approach theoretically and simultaneously develop an operational model. Almost by definition this required an interdisciplinary, participative and applied research process.

In line with complex adaptive systems thinking, it can be argued that for my research a predefined, linear research approach would have been impossible and counter-effective. Any type of research in practice will be more unpredictable than suggested by research formats and standardized processes, but in the case of research on transition management, even the goal of the research was unclear in the beginning, let alone the proper hypotheses and methodologies. An open and explorative research approach therefore seems to have been the only way possible, in which during the research process the basic research question evolves and the best methodologies and research approaches are chosen. In practice this has implied a research process reconstructed afterwards, in which traditional and new research methods were used and accordingly my role as researcher shifted from fundamental to applied and action researcher and from consultant to practitioner. Although dealing with complexity requires creativity, innovative capacity, intuition and flexibility, scientifically the research methodology needs to be solidly underpinned. This chapter describes the basic research methodologies and approaches I have used for my research and how these were combined.

2.1 Transition studies: theory development, methodology and a new paradigm

Is there a methodology for developing a theory? Mintzberg (Mintzberg 2005) states that perhaps only cognitive psychologists could answer this question. Theory development, he claims, is not an objective nor is it a deductive process. It is, however, an unexpected, explorative process and involves a great deal of art and craft (it is a searching and learning process). Theory development is about inventing explanations that will only be accepted when useful in explaining complex phenomena. Once formulated, a theory might be tested, validated, falsified and improved or dismissed. Theory development as such is not a bureaucratic or formalized process, nor is it a deductive and predictive process. Basically, development of theory is the process of giving meaning to every-day phenomena based on scientific reflection. That this process is contextual, i.e. heavily influenced by social context and the (technical) substance of the subject

of study, is demonstrated by Latour (Latour 1987). Although he focuses on more fundamental types of research, a valid observation for applied social sciences is that developing new insights and theory is as much influenced by the researcher as by the research object and the context in which the research takes place.

Scientific methodology is primarily concerned with falsifying or testing theory. Even Popper (the title of his work 'Scientific Discovery' (Popper 1959) suggests otherwise) focused on the falsifying process rather than on the discovery of new theory (Mintzberg 2005). Falsifiability refers to the property of empirical statements or claims that they must allow for logical counterexamples. Popper asserted that no empirical hypothesis, proposition, or theory can be considered scientific if it does not admit, at least in theory, the possibility of a contrary case. Falsifiability is a property of statements and theories, and is neutral with respect to the question of 'meaningfulness'. Much that would be considered meaningful and useful is not falsifiable. The 'Popperian' criterion does not exclude unfalsifiable statements from the domain of science, but only whole theories that contain no falsifiable statements. Especially theories on 'how the world works' are social conventions and evolving over time (because of changing contexts). They cannot be falsified in a 'Popperian' sense, but are subject to negotiation, argumentation and application. It is, however, in any case useful to know if a statement or theory is falsifiable, if for no other reason than that it provides us with an understanding of the ways in which one might assess the theory. One might at the least be saved from attempting to falsify a non-falsifiable theory, or come to see an unfalsifiable theory as unsupportable, let alone as not meaningful.

A societal transition theory in a nascent stage is not fully falsifiable in the Popperian sense and will never be, in view of the fundamental uncertainties and the impossibility to measure the different dimensions of transitions exactly. Transition research is therefore exploratory; it aims at developing and adjusting research hypotheses as an integrated part of the research process. This means that we will work with provisional research hypotheses, realizing that these can only be tested in a partial and relative sense and might be adjusted during the research process (Glaser and Strauss 1967). The partial and relative testing takes place through a combination of pattern matching, comparing empirical transition patterns with theoretically expected patterns, and process tracing, historical reconstruction of events and mapping of chronology or construction of expected future events (Rotmans et al. 2004). The basic hypothesis which is to be tested and elaborated in transition research is that the multi-level and multi-phase concepts form a sound and adequate heuristic framework to describe and explain the complex dynamics of societal transformations. In order to test and elaborate the transition framework, hypotheses on many different aspects will have to be developed and elaborated. One of these provisional hypotheses, and central to this thesis, is that it is possible to influence structural societal change based on the understanding of transitions.

Transition theory opposes linear or technical theories for explaining human evolution and societal change, but is not more 'true' or 'false' than the others. It offers a framework to analyze large-scale, long-term processes of societal change as the outcome of interactions and developments of different sizes and speeds over time. Transition theory is based on a systems approach and inclusive as well as flexible. As such, it can be considered a meta-theory that could integrate existing models and theories, even seemingly opposing approaches as long as

they are compatible with the basic notions. While transition theory by definition excludes linear models to explain systemic behaviour, linear patterns can very well be observed at lower levels of scale. Explanations that are valid or useful at one level of scale could very well be challenged by observations at another level of scale. Similarly, different research and societal perspectives could very well interpret a transition fundamentally different or perceive the state of a system or transition differently. The transition theory therefore provides a fertile soil for scientific debate, integration of scientific disciplines and insights, and also generates new and unforeseen challenges and questions regarding the nature of scientific research and the value of traditional scientific paradigms. As Donald Hebb (as quoted in: Mintzberg 2005) phrased it: 'a good theory is one that holds together long enough to get you to a better theory'.

Where Latour emphasized the importance of social context for scientific theory development, Kuhn highlighted the importance of individual researchers' competences and perspective. Kuhn demonstrated that scientists work within a conceptual paradigm that determines the way in which they view the world and that sociological factors are likewise important in the progress of science; i.e. the decisions which theory is dismissed and which one continued upon (Kuhn 1962). In his model of the scientific process, Kuhn more or less dismisses the idea of falsification of theory as described by Popper. According to Kuhn, theory is never perfect and it is just because of the imperfections and the drive to solve these that theory is further developed. He therefore also sees other external factors as influential, such as irrationality in the scientific process of competition between theories and models. Kuhn observed 'scientific revolutions'; periodic phases of revolution in which scientific paradigms shift. In this process, pre-existing theories are 'creatively destroyed' through a sudden (irrational) shift to new theory or models. New theory opposes existing assumptions and claims, while also explaining why these assumptions and claims are no longer valid. But which ones will break through and when is unpredictable.

Transition theory can in a sense be seen in this light of new theory that challenges fundamental assumptions in some existing research paradigms. Over the last decade or so, uncertainty linked to sustainability is emerging worldwide as the foundation of a new research paradigm to which also transition research adheres. Ravetz calls this transition 'a revolution in epistemology: science does not deliver certainty' (Ravetz 2006 80). Influenced by complexity thinking, integrated approaches and sustainability, a new research paradigm and field emerges in which the traditional gap between fundamental and applied research is bridged (Rotmans 2005 21). These two stereotypical types of research, fundamental and applied, are described by Gibbons (Gibbons et al. 1994) in terms of Mode 1 (science-driven, predominantly mono-disciplinary and based on formal scientific procedures) and Mode 2 (society-oriented, often multi- or trans-disciplinary and based on new research roles and practices). Gibbons witnesses a shift from Mode 1 to Mode 2 science, but in practice, we can see both types evolving and also new hybrid forms emerging. In the context of transition studies, we might therefore speak of Mode 1 and Mode 2 research, because in the practice of research on transitions and transition management there is a continuous iteration between fundamental and applied research. It is multi- and interdisciplinary (combining and integrating scientific disciplines), transdisciplinary (integrating tacit, lay knowledge with scientific knowledge) and normative. The new research

paradigm is holistic, values fundamental and tacit knowledge equally, views the researcher as part of societal networks (in which he/she has a specific role and influence) and is normative in its orientation towards sustainability. It is characterized by a focus on complexity, uncertainties, and non-linear development (also of knowledge).

Methodologically, the new research field of transitions requires new types of research that have an integrative nature, are normative in their ambitions, have a desire to contribute to societal change and are participatory. Over the last decade, a number of such new types of research have emerged. Examples are Sustainability Science, Integrated Assessment, Post Normal Science and Action Research. Although these examples are partly grounded in and based on existing approaches and methods, they all provide a new way of conceptualizing the research process and the role of researchers. They therefore provide a valuable basis for conceptualizing 'transition research'. Transition management is a unique example of a research topic that by definition cannot be developed in a traditional, purely scientific sense. It is based on the transition theory, itself still a theory in development, and presumes that an understanding of transitions can lead to other types of (policy) practices. There is no existing transition management to be studied; it is a new concept that needs to be defined both in theory and practice. This type of research is implemented in the national research programme on transitions in the Netherlands (www.KSInetwork.org), which is based on a combination of fundamental, applied and participatory research (Rotmans et al. 2004).

The only way to achieve coherence between theory and practice of transition management is through a learning-by-doing and doing-by-learning approach in which fundamental research, theory development, participatory research and applied research are combined. A research methodology can only be based on methodological tools that are used based on the unfolding research process: as new theoretical insights emerge, experimental and exploratory cases are used, and vice versa when observations about operational processes inform or challenge theory they need to be structured, integrated and grounded. This is the research approach behind this thesis: it is positioned within the development of new types of sustainability related research but integrates and combines a number of elements of these different approaches. Methodologically, traditional methods are used as well as new ones, for example participatory research or normative, exploratory case research. In that sense we do not claim that the research process as followed in this thesis is in itself new, but it is innovative because of the integration of existing (old and new) research approaches and methods. To define the research approach of this thesis and the role of the researcher, and to underpin the research methodology, the new types of research that are relevant are presented, along with their specific contribution to transition research.

2.2 Integrated Assessment and transition research

The multi-level, multi-phase transition concept is an Integrated Assessment concept. Integrated Assessment (IA) (Rotmans 1998) is defined as a scientific "metadiscipline" that integrates knowledge about a problem domain and makes it available for societal learning and decision making processes. It is a relatively recent scientific field that emerged during the 1990s and is explicitly concerned with

providing policy-relevant knowledge for complex societal problems. Because of this ambition and the focus on complex problems, IA by definition is interdisciplinary (integrating scientific disciplines) and transdisciplinary (integrating scientific and lay knowledge). IA has been used as a new research paradigm in for example modelling, scenario-based research, and complexity research, but has also influenced the debate on the role of research for policy making. IA has a history of being applied first and foremost in the area of long-range and long-term environmental policy issues, but has developed to a research approach accepted in the policy arena to be supportive for long-term policy planning processes (Rotmans 1998; Rotmans 1999). In this context, the transition concept emerged as the meta-concept to integrate sustainable development, dealing with uncertainties and participation. By definition, transitions cannot be understood from one scientific discipline or societal perspective and thus require IA research approaches and tools.

This fits within the development within the sciences of the so-called 'Post-Normal Science' (Funtowicz and Ravetz 1994; Ravetz 1999) that legitimates the involvement of diverse knowledge sources in science for policy through calling for extended peer communities and emphasizing the inherent uncertainties and values in policy-related science. Key notion in IA (and in Post-Normal Science) is the acceptance of uncertainty and ambiguity, which necessitates a participatory research approach or at least a structured form of interaction between researchers and societal actors to produce policy-relevant knowledge. Obviously, transitions are complex societal processes that can only be understood (or better: interpreted, given meaning), through integration of scientific and practical knowledge. Sustainable development in this context is, according to the field of IA, a possible normative orientation that provides a frame of reference to discuss and direct differences in perception, ambition and understanding between actors. The rationale behind this is that solutions for Sustainable Development can only be called sustainable when they are (co-)developed, implemented and sustained by societal actors (Clark 2003). This means that scientific knowledge related to Sustainable Development is not a goal in itself, but rather a means to achieve progress. From this perspective, a modest and vulnerable position of a scientist in the process of Sustainable Development is required, rather than the position of provider of objective truths or that of outside reflector producing policy-advice as an end-product of his or her research. The objective position of research(ers) related to policy and in general the science-policy interface has already been the subject of debate for decades (e.g. Wildavsky 1979; Hisschemöller and Hoppe 1996), but has been revived in the context of Sustainable Development, where scientific knowledge as well as political and social knowledge are all as ambiguous as the solutions and outcomes (Hisschemoller et al. 2001).

A field closely related to IA and transition research is that of Sustainability Science (Kates et al. 2001; Kasemir et al. 2003; Clark et al. 2005; Martens 2005). Stemming from the field of science and technology, 'sustainability science' has emerged as a (somewhat controversial) term depicting those developments within scientific disciplines that deal with sustainability issues, increasingly in cooperation with practitioners. Without being as defined and concrete as IA, Sustainability Science is more or less a general term for a development in science as a whole towards more multi- and interdisciplinary research related to complex societal issues. Sustainability Science mainly refers to the field

of global environmental and sustainability research and also emphasizes the importance of the involvement of stakeholders in the knowledge development process. While IA offers concrete tools and methods for complexity and sustainability research, Sustainability Science redefines the role of research and researchers at an abstract level. For transition research this is relevant, since the ambitions behind transition research are similar to those behind Sustainability Science: scientific and societal impact based on an active and participatory role of researchers.

This participatory role has been theorized and methodologically underpinned over the last decade. In fact, participatory knowledge development, aimed at integrating practical/tacit and scientific knowledge, has become a new field of research in itself (Van Asselt 2002; Kasemir et al. 2003). The central issue in this field is that participation in practice is often unstructured and ad hoc and that methods and tools for both participatory policy making and participatory (integrated) research need to be developed and tested (Van de Kerkhof 2004 52-53). Although participatory methods (e.g. focus groups, consensus conferences, scenario exercises, gaming etc.) have a long history, they have been reinterpreted in the context of IA with regard to the profile of the participants, the goal of participation and the degree of participation (Rotmans 1998). So far, participation has mainly been used in the context of policy-making (to generate public support) and has been underdeveloped in scientific research as a means to generate knowledge with a higher relevance for society. The rationale behind participation in research such as IA and Sustainability Science is, that the knowledge generated is not only relevant for the practical situation (problem) it is developed for, but that the participants have already during the knowledge development process internalized some of the knowledge generated, which enhances the chances for application of the knowledge. The participatory approach behind transition research serves these two main goals: development of new knowledge and also application of this new knowledge and through that change in real-life. The participatory approach is thus an instrument for the transition researcher to transfer knowledge as well as to develop new theory.

Key notion in these processes of knowledge co-production is that of *phronesis*; practical, context-relevant wisdom and knowledge (Loeber 2004) produced in a participatory process. Knowledge for sustainability by definition needs to be context specific and participatory developed. A major drawback of most existing participatory methods is that they do not start explicitly from a collective goal but often from a specific policy problem, and that they do not demand any specific abilities from participants. When we start from the objective to deal with a complex societal problem, we can, however, develop specific requirements to the context in which relevant knowledge is developed (*phronesis*) as well as to the process that is gone through. This means that, since the objective of transition management is to produce policy relevant knowledge, participants are chosen based on their possible contribution to this solution, that the method is based on the process needed to achieve the solution and that their involvement and advice actually needs to be taken seriously. For transition management, this has implied a theory based participatory research process leading to the definition of selection criteria and process design of the transition arena methodology (see Chapter 6).

2.3 Action Research and systemic thinking

Transition research also strives for a specific contribution to society in terms of contributing to sustainable development. Within the field of transition research there is a significant amount of fundamental research, but the research related to transition management is by definition (partly) applied and participative. While many scientific disciplines (such as policy sciences) often shy away from normative approaches, transition research makes this ambition explicit. Based on the assumption that any type of research related to society can never be fully objective, transition research is explicit about its aims, and from there needs to develop methodologies that ensure that the research process itself is as structured and transparent as possible. In sociological studies, there exists a long tradition of applied research based on normative objectives (i.e. promoting social change), which is generally referred to as action research. Dissatisfied with sociological research that seemed increasingly detached from the subject of study, and even from society itself, and driven by the ambition to change society for the better based on scientific insights, researchers have been engaging in participatory (action) research processes. In these processes, scientific knowledge and practical experience are linked to help practitioners deal with imminent problems and contribute in general to the improvement of society. For this process a large number of definitions exist; some emphasize the importance of interaction with practitioners, others the scientific role of researchers or the importance of reflection on progress made. Within all these definitions there are four basic themes: empowerment of participants; collaboration through participation; acquisition of knowledge; and social change. The process that the researcher goes through to achieve these themes is a spiral of action research cycles consisting of four major phrases: planning, acting, observing and reflecting (Zuber-Skerrit 1991:2; as quoted in (Masters 1995)). Main purpose of action research therefore is the application of scientific knowledge and the use hereof by practitioners.

The action research process is thus also participatory by nature, whereby the researchers have the specific role of facilitator and teacher (Greenwood and Levin 1998). By redefining the role of the researcher (as a participant in a process of co-production) and of research (as a means to achieve desired social change), Action Research involves a critique of conventional academic practices and methods which first and foremost tries to study social problems without trying to resolve them. It does however not exclude these traditional approaches, but use them within a broader context. Action Research has emerged as a shared practice in different sociological disciplines (e.g. anthropology, psychology, social work, planning, development studies etc.) and is therefore not a discipline in itself (much like Sustainability Science). The generic characteristic of the action research paradigm is, again, that of co-production, but in a very pragmatic way. Action researchers bring to the table certain skills and knowledge, and other actors do the same, bringing their own capacities and experiences to bear on the problem (Greenwood and Levin 1998 11). Transition research utilizes the theory and tools of action research, but also links the action research component explicitly to development of theory. While action research is primarily concerned with application and transfer of existing theory, models, concepts and knowledge, transition research aims to develop new ones.

Methodologically, action research has been underdeveloped: it has emerged based on new research practices and on individual researchers' ambitions to contribute to change instead of being based on a sound theory. This has more than once evoked criticism on Action Research as producing subjective, disputable or unscientific results when compared with the classical, fundamental research process. However, one can argue that social (science) research is different from fundamental research and that consequently the scientific methods also need to be different. From this perspective, it would even be questionable to what extent research methods from the fundamental sciences could lead to relevant social research results. Because of the objective of action research as producing meaningful knowledge for society, it needs to integrate reflection and action (and not separate the two as in fundamental sciences) and can therefore only be methodologically structured in terms of repetitive and iterative action-reflection-action cycles (Greenwood and Levin 1998). Of course within such a process traditional research methods can be used to support specific steps or decisions, but only as means and not as objectives. This has led to a new research field in itself that focuses on action research methodology (Reason and Bradbury 2001; Van Asselt 2002; Kasemir et al. 2003)

The action research approach gels well with systemic thinking and IA. Systemic thinking is the term used for the approach that sees the social construction of the world as systemic; each view offers its own fundamental knowledge for practice (Flood 2001 133). Since complex societal issues are by definition perceived differently by different actors, systemic thinking can provide a necessary precondition to achieve some sort of alignment and integration of these perspectives. It can support the process of giving meaning to a complex reality, structuring a complex problem and developing shared perceptions of reality and expectations about future developments. 'What prevents us from overcoming policy resistance is not a lack of resources, technical knowledge, or a genuine commitment to change. What thwarts us is our lack of a meaningful systems thinking capability. That capability requires tools to understand complexity, stocks and flows, feedback, and time delays' (Sterman 2006 513). For transition research, this is a relevant insight since it suggests an approach that combines elements of how to structure the participatory research process as well as how to structure the substance-part of this process. In other words: transition research should be concerned with the process (in terms of involvement of stakeholders, process tools, validation of the research process) and with the substance (integration of societal perspectives, knowledge and goals, structuring problems and solutions and normative goals). A research process of developing, co-producing, relevant knowledge based on a complex systems approach combined with a participatory, action research approach, seems to provide a fruitful way to achieve the desired integrative, interactive and innovative process.

2.4 Case study approach

An important method in social science research is the case study. In general, a case study is used to illustrate, validate or explore theoretical concepts and hypotheses. In social sciences, case studies are predominantly qualitative: they are used to describe, understand and explain certain phenomena. Case study meth-

odology is very much an area of debate, since it is treated as a means to 'objectify' research findings. Because in social sciences there is often a limited number of case studies available and data are always partial or limited, the debate focuses on the possibility of drawing general conclusions from a limited number of case studies. A frequent criticism of case study methodology is that its dependence on a single case renders it incapable of providing a generalizing conclusion. Yin (Yin 1984), however, argued that the relative size of the sample whether 2, 10, or 100 cases are used, does not transform a multiple case into a generic study. The goal of the study should establish the parameters, and should then be translated into the case study design. In this way, even a single case could be considered acceptable, provided it met the established objective that it allows for analytical generalization (rather than statistical generalization). Yin (Yin 1984) stated that general applicability results from the set of methodological qualities of the case, and the rigor with which the case is constructed. For this, he developed detailed procedures that would satisfy the required methodological rigor, yet in spite of this the role and methods of case study based research remain disputed.

In the context of transition studies, case studies can never be seen as supportive of the scientific process in terms of providing data, illustrative narrative or new hypotheses only. Case studies are at the same time also the place where research findings can be transferred to practice and where new insights for theory are found. Case studies, or in general applied projects, are therefore an essential environment to be active in for transition researchers, as much as the library or study hall. In social sciences, there has been for long a tendency to become as formal as possible to achieve a level of 'scientific rigor' standard in the natural sciences. This has led to the use of case studies in a predominantly illustrative sense, based on the idea that case-studies cannot be used to generate or test theoretical insights and assumptions. Unlike the natural sciences where theory testing can take place in a laboratory, social sciences do not operate within such a closed environment that allows for risk-free testing and experimenting. Theory development in social sciences based on observation, exploration and participation is therefore rare, but not necessarily impossible or unscientific.

Flyvbjerg (Flyvbjerg 2001) argues for a redefining of social sciences and its role in society by arguing for more narrative approaches and development of new methodologies for social science research. His central argument is that social sciences should not imitate natural sciences and that social science by definition needs to interpret and value society and changes herein. That this is a normative exercise is not scientifically unsound but at the heart of what social science should be. This is illustrated by the use of case studies within social sciences, where Flyvbjerg (Flyvbjerg 2006) distinguishes five main misunderstandings: (a) theoretical knowledge is more valuable than practical knowledge; (b) one cannot generalize from a single case, therefore, the single-case study cannot contribute to scientific development; (c) the case study is most useful for generating hypotheses, whereas other methods are more suitable for hypotheses testing and theory building; (d) the case study contains a bias toward verification; and (e) it is often difficult to summarize specific case studies. Flyvbjerg argues that a combination of qualitative and quantitative methods is necessary for social sciences and that case study can provide a fertile soil for experimentation and generalization as well as for testing and validation. The use of cases depends on the research objective as well as on the actual case. In many instances, extensive

case-study research has led to major adaptation in initial research hypotheses and assumptions. In this light, case-study research rather serves the process of theory development than that it can be used to validate. A recent debate in sociology is that about the 'normative case study'. Normative case studies could very well play a vital role in the prescriptive study of values and ethics (Thatcher 2006). What is meant by this is that normative case studies could provide a context in which social scientists engage with practitioners to 'find out' what public values and moral is related to a specific subject (i.e. a city or region). This is more or less the rationale behind the use of a case study element in the context of transition research: case studies provide a participatory environment in which provisional hypotheses can be tested and refined.

2.5 Transition research approach

Transition research combines traditional and new types of research and the underlying methodological approach is thus based on integration and combination of methods linked to the specific research context and questions. The impact of the concept of transition management on policy-making and the rapid development within the scientific community shows a clear need for this type of participatory, normative and integrative research next to more regular scientific research and knowledge. The major weakness of the new type of research sketched here is that much depends on the abilities of the researchers and practitioners involved to communicate so that they understand each other, can co-produce knowledge that is scientifically and socially relevant and develop solutions that are actually used in practice. Especially for researchers, the reflexive component that now becomes part of the research process (feeding back insights from practice into the theory) requires different ways of dealing with a diversity of participants, different normative interests and ambitions, different sources of knowledge.

Participatory approaches in general suffer from a tendency to become self-referential and internally oriented, for example participatory research projects in which only researchers from different fields are involved to discuss about the application of scientific knowledge. Or participatory processes in which no clear goals are defined from which the type of process, the facilitation and the preferred outcomes are derived. For transition research, overcoming these possible pitfalls would imply a further defining of its research approach and methodologies, but also a much clearer definition of the researchers' roles and associated competences. Because of the variety of methods that need to be integrated and combined in transition research, individual competences and interests can be a determining factor in deciding where individuals can contribute to the field. Development of competences and skills that enable the researcher to fulfil different roles linked to research ambitions through training and experience should thus also form an explicit part of a transition research process.

This thesis started from an idea: *transition management*. This idea does, however, evoke a multitude of questions and a general wish to improve knowledge and understanding about transition processes and management in the context of transitions. The research is therefore, like all research, problem driven and departed from a scientifically defined need for knowledge, insights and methods.

However, the specific research questions related to the need for new knowledge (what kind of new knowledge would be needed?) were not clear beforehand and developed over time. Unlike a regular research process design, such as for example sketched by Giddens (Giddens 1993 678), there could be no linear process design based on precise research questions and objectives. The elements of a regular research design, however, were obviously part of the process: literature review, hypotheses, case studies, evaluation and reflection. Like most research projects the steps taken are not sequential; sociological research in general is characterized by a certain amount of sheer 'muddling through' (Bell and Newby, 1977, as quoted in: Giddens 1993 679). For the research presented in this thesis this is also the case.

Transition research in general consists of three components: theory development, iteration between theory and practice and (contributing to) social change. As described before, this has led to a research process in which methods and approaches from different fields were used: 'regular' research approaches and methodologies, Integrated Assessment and Post-Normal Science, applied and action research and case studies. In fact all four fields were used in different ways for developing the different elements of transition management presented in this thesis: transition management as complexity governance concept, the framework for transition management and the operational transition arena model. While on the theoretical side the research approaches and methodologies were used mainly analytically and deductive, for the applied development of the transition arena model they were used in an experimental and inductive manner. How these three components relate to the different types of research used is schematized in Table 2.1 below.

Transition management elements	**'Regular' methodologies**	**IA elements**	**Action research elements**	**Case study elements**
Complexity governance	Desk research Literature analysis	Integrative theory & model development		Emergent theory development
Transition management framework	Theoretical grounding Theory-practice iteration	Provisional hypotheses	(Provisional) theoretical structure	Narrative/ illustrative case study
Transition arena model	Literature analysis Case study evaluation Analytical generalization	Participatory research	Theory application Participation with practical and theoretical goals	Explorative case study Normative case study

Table 2.1 Thesis research methodologies

The research in this thesis has been a process along two-tracks. The first track was an analytical process of theory development based on initial transition concepts and on an interdisciplinary, integrative approach. From the (integrative) theory that was developed, a number of concepts, ideas and tools were deduced

into an operational model for governance of structural change towards sustainability. The second track was more inductive and explorative and started from practical projects and contexts in which the researcher was involved. Based on actual governance processes, experiences herein and reflection on theoretically based tools and methods used, insights emerged that contributed to the operational model derived (partly) from theory. The working hypothesis that *transition management is an adequate model for managing transitions* was tested through literature research, historical research, exploratory action research and empirical case studies in an iterative process. As a researcher, I fulfilled different roles during the research process: analyst, facilitator, reflector, co-producer, participant, theory developer and trainer.

The research in this thesis is methodologically based on Integrated Assessment, especially its analytical methods of problem structuring, knowledge integration and analysis, and its process tools such as participatory methods. In this thesis, these elements have been combined with evolutionary and reflexive theories to develop new theory and models. Because of its explorative, participatory and interdisciplinary nature, this research can be positioned within the field of Sustainability Science and Post-Normal Science. It embraces theoretical and fundamental as well as applied and participatory research approaches. Only out of the iteration between the two, have a coherent and meaningful theory and model emerged. This thesis is interdisciplinary in the sense that it is based on integration of insights from different theoretical scientific fields (complexity, sociology and governance) into a coherent new theory. Chapter 3 of this thesis describes the elements from these different fields that are integrated with one another: insights about systemic behaviour, dynamics of societal change and governance processes. This thesis is also transdisciplinary in the sense that the presented theory and operational model are heavily influenced by and co-produced with societal actors in real-life policy-making processes. The research in this thesis is therefore a combination of relatively recent, and still developing, research approaches and existing, more traditional methods, used in a new research context.

The research in this thesis therefore builds heavily on knowledge produced in a participatory setting and the reflection upon these participatory processes. This is reflected in the approach used in projects in which the operational model for transition management was applied and developed (see Chapters 6 and 8). Concrete projects in which transition management could be applied and experimented with, and in which we, as transition researchers, could engage in action research and translate learning experiences into new theoretical ideas and hypotheses, provided a valuable research context for this thesis. Such projects, because of the interaction between transition researchers and practitioners, led to meaningful knowledge related to the societal problems at hand and generic knowledge regarding transitions and transition management. The reflexive components of this PhD-research especially, i.e. the adjustment and development of theoretical assumptions based on practical experience, set this research apart from Action Research, in which theory development in itself is not a goal. In both IA and Action Research the objective is mainly to co-produce socially relevant knowledge, based on an existing body of knowledge and existing concepts. The research in this thesis has also utilized the participatory setting for the development of meaningful scientific knowledge. Examples are the transition management framework (Chapter 5) and the operational model for transition

management (Chapter 6). Both are based on a theoretical idea, but really developed in operational projects. For example: theoretically it seems necessary to develop a shared long-term orientation to guide short-term actions. How this could be translated into operational models was primarily based on practical experience and systematic reflection hereupon. Applied projects provided the context to test out theoretical ideas while simultaneously experimenting with different models, methods and instruments and refining them. In this sense deduction and induction were followed simultaneously leading to a gradually emerging analytical approach and operational model that meet in the transition arena model. This is captured in Figure 2.1.

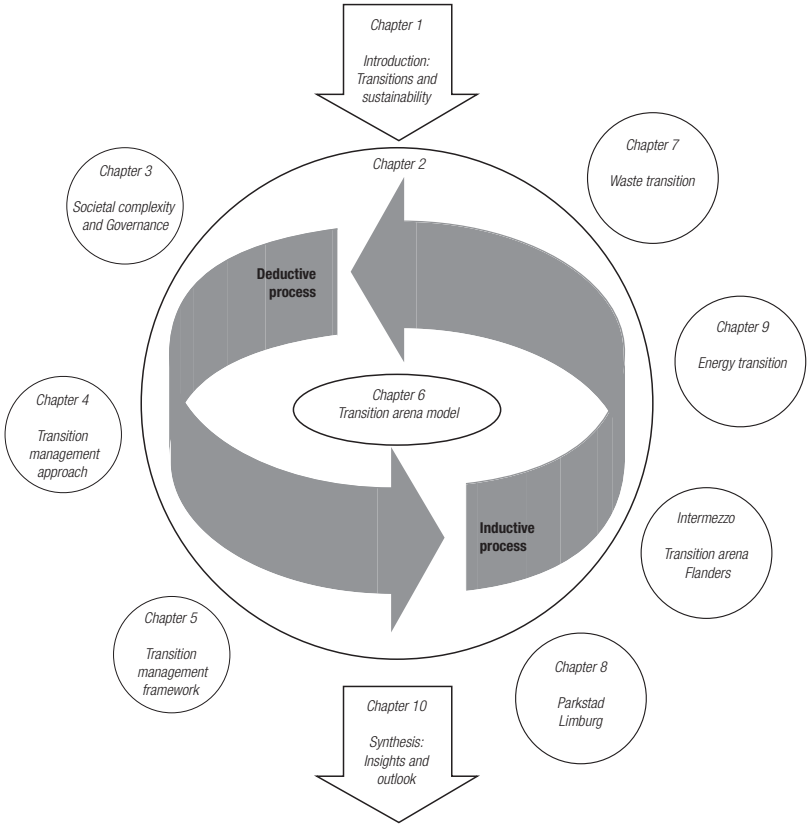


Figure 2.1 Thesis and research structure

2.6 Research methodology

The theoretical part of this research is in the first place aimed at developing the transition management concept by integrating complexity science and governance theory at the level of societal systems such as the energy-supply, the mobil-

ity or the agricultural systems. Complex systems science and sociological theory are used for the analytical component. This relates to how we understand complex processes of change in society and their underlying mechanisms. Based on the understanding of these mechanisms, theoretical starting points for governance or management can be formulated. The governance (process) part is then developed using governance and policy theories that directly or indirectly relate to dealing with (complexity) patterns of societal change. The basic approach of developing and implementing transition management conceptually and operationally is thus based on an iterative process between theory and practice, and between analysis and process. Further understanding of the dynamics of transitions and transition management inspired operational approaches that were experimented with, which further informed theory development and so on.

Complex systems science (Hall and Fagen 1956; Holland 1995; Kauffman; Midgley 2000; Gunderson and Holling 2002) is used to identify mechanisms of (co-evolutionary) change in complex systems such as variation and selection, emergence, co-evolution, self-organization and adaptation. Social theory (Giddens 1984; Luhmann 1984; Giddens 1987; Coleman 1994) is used to conceptualize societal complexity and to develop a social-systems approach based on network- and institutional-approaches. Theories on policy processes (Lindblom and Woodhouse 1993; Hajer 1995; Sabatier and Jenkins-Smith 1999) and governance (Kooiman 1993; Mayntz 1993; Ostrom 1993; March and Olson 1995; Jessop 1997; Eising and Kohler-Koch 1999; Pierre and Peters 2000; Hooghe and Marks 2001) provide insights on how to deal with policy and governance in a modern, complex society. By comparing these three different scientific fields with each other, the basic principles for a complexity based form of governance were formulated.

After that the basic principles underlying transition management (thinking in terms of multi-level and multi-actor, dealing with uncertainties, keeping options open, focus on learning and envisioning (Rotmans et al. 2000)) were refined and further developed based on the theoretical complexity based governance principles. By linking this governance model to the normative goal of sustainable development, we defined transition management as: '*long-term governance for sustainable development based on a complex adaptive systems approach*' (Loorbach 2002; Loorbach 2004). Simultaneously, by building on existing governance and policy theories, we positioned transition management as a new governance approach in the field of governance. We therefore compared it with major schools in this field such as incrementalism, interactive and adaptive governance, planning and reflexive governance (Kemp and Loorbach 2003).

From this complexity-based governance paradigm, a multi-level framework for operationalizing transition management was developed that distinguishes between different levels and types of governance processes. This framework is translated into a cyclical process structure, and combined they provide the basis for organizing and facilitating the so-called transition arena; an innovative participatory process of envisioning, searching, learning and agenda-building aimed at social learning as a means to achieve (sustainable) social change. This transition arena model is also partly a result of the empirical research track and further refined and developed based on implementation in an operational setting.

The second part of the research is exploratory by nature. Based on the developed multi-level framework, the transition arena model was further developed, tested and implemented in different societal settings at different levels through

participatory action research. The research was conducted in the context of policy-making processes in which the experimental model and approach of transition management was implemented. The theoretical framework and the operational approach were iteratively developed. This part of the research was by and large experimental, applied and problem-driven. Based on concrete societal problems in which new solutions were sought, and motivated by our explicit ambition to support societal-decision making, we as transition management researchers could propose and later on organize and facilitate a transition arena process. In such contexts our roles changed from traditional researchers analyzing problems via co-producers of new insights, to facilitators and organizers of transition processes. As researchers, we were also involved in a number of projects related to transition management, which had to deal with specific elements such as evaluation, envisioning or integrated system analysis. Finally, we were involved in ongoing policy-processes and projects as transition researchers in a more or less traditional role, providing knowledge and observing and reflecting on the process. A number of these projects are taken up in this thesis as case-studies, while others are used more indirectly to support specific arguments, elements or concepts.

The dynamic theoretical and practical research environment provided a fruitful context for experimenting with, and developing and testing of theoretical ideas and concepts. I was personally heavily involved in two two-year transition arena projects for the Parkstad Limburg Region and for the Flemish Housing and Building system. I was involved in different ways in the energy transition process: for example in the envisioning project for Biomass, in the Bioplastics transition-path, in the overall evaluation of and reflection on the process, and in general in structuring and organizing the process of expanding the process to larger networks and from vision to images and transition paths. Besides the integral implementation of the transition arena methodology, different elements of transition management (envisioning, participatory processes, experimentation) were tested in different cases and projects. In this way, practical experiences of various sorts informed the theory and vice versa, often without planning or explicit selection of these projects as case studies for this thesis. In fact, most of these projects and experiences only made their way into this thesis indirectly in the form of insights, arguments, examples or ideas.

2.7 Case studies

The cases supporting my research serve different goals and were of a different nature. The cases were used to test hypotheses, to illustrate concepts, to explore new ideas, to develop better practical tools and methods, and last but not least to produce meaningful results for the participants. The cases all had a scientific as well as a practical goal. The three cases dealt with in this thesis are: The historic Waste Transition, 1970-2000 (Chapter 7); envisioning project Parkstad Limburg (Chapter 8); and the Energy transition (Chapter 9). The choice for three different in-depth case studies was not explicit but part of the explorative, learning-by-doing process. The theoretical and operational research requirements influenced the choice for case studies, but those case-studies in their turn influenced the theoretical and operational progress. Out of this iteration between theory and practice and the selection and use of appropriate approaches and methods

related to the context-requirements, the presented research approach and methodology has emerged. It has therefore also been partly reconstructed afterwards. However, the whole process was driven by an overall ambition and goal, in which sense the short term decisions were neither random nor fully unstructured or unplanned. It is, however, necessary to address the role of each case in my research clearly, as well as the way in which the case was conducted.

The first case is the historic Waste Transition. This case study was a more or less traditional, ex-post case study in which I acted as a researcher. Basic research methods used were desk-study, in-depth interviews and an expert workshop. The subject of study was chosen as an interesting domain for the NWO funded research project 'Transitions: what drives them and how are they managed?', led by René Kemp at Merit (Maastricht University). The project aimed at deepening the understanding of transitions and contributing to transition management. A sub-set of research questions was: what was the role of public authorities (in different phases)? What do the transitions tell about the proper role of public authorities and public policy in various transition stages? More specifically, what does transition management look like for waste management? During the project, which ran from 2002 to 2004, my contribution focused on a multi-level policy analysis of the changes in waste management. The aim was to understand the shift from a local, decentralized waste management system to a centralized, liberalized and professional waste management as an outcome of an autonomous transition process (driven by for example increasing consumption, use of plastics, growing environmental awareness and emerging new technologies) in co-evolution with all sorts of governance related to this transition. By interpreting these governance activities as transition management *avant-la-lettre* and by trying to structure these activities, the research led to a more refined and focused definition of transition management as involving those governance activities that relate to actively promoting a transition. By building on the multi-level concept, three levels of governance were distinguished, which are the core of the multi-level, multi-phase framework as presented in Chapter 5. The three different levels were later on defined and further developed based on the other case studies and additional literature review. This case study was illustrative in the sense that it provided a narrative that supports the transition concept and shows its analytical use. It also illustrates the concepts of transition management, including the different governance levels.

Methodologically, this case study was based on literature and policy document analysis and integrated system analysis (ISA). This provided a first rough demarcation of the 'waste management system'. Then, statistical data and additional information was gathered to support the first literature review. The initial analysis that resulted from this was in part policy-analysis, institutional analysis and causal (cause-effect) analysis. Together, this provided a qualitative and for some parts quantitative narrative. An actor-analysis was carried out to plot the current waste management system and identify key players with whom structured interviews were conducted. Their interpretations were included in the analysis and the final results were discussed in an expert workshop. The experts, who came from various backgrounds (policy, business, industry, environmental NGO), commented on and validated the analysis. Finally, expectations on how the transition would further evolve and recommendations for transition management were formulated.

The second case study for my thesis is the transition arena Parkstad Limburg, a 2-year envisioning process based on transition management. This was a demand-driven case study in which we were fortunate to be able to experiment with the transition management model. In this case study, I acted in different roles: as researcher, analyst, participant, observer and manager/consultant. During the project, a whole range of research methods was used: desk-study, interviews, participatory methods (brainstorming, envisioning, and scenario workshops), evaluation and expert workshops. Being the first ever project in which transition management was integrally used as a guideline for the organization of the process, this project provided a unique experimental environment. During two years, parallel to the theoretical development, the operational model for transition management was implemented, developed and evaluated. Also, various policy and participatory tools and methods were used to support the envisioning, which made it possible to evaluate their effect within transition management. Theoretically, this case provided a number of new hypotheses (related to for example participant selection, the management of the interface between the transition arena and the outside world) and provided illustrative and supportive argumentation for theoretical assumptions, thereby underpinning them. The project was based on an Integrated System Analysis and an Actor Analysis, including a limited number of structured interviews. The process was documented and evaluated in hindsight through document analysis. This case is described in Chapter 8.

Finally, the Energy transition was selected as a case study for this thesis. This refers to the activities facilitated and coordinated by the Dutch Ministry for Economic Affairs around promoting a sustainable energy-supply system in the Netherlands. As such, this is a supply-driven case study, in which I played more passive and traditional roles such as analyst, reflector, evaluator and observer. Besides, I also participated in the process as an expert during some phases of the process. Diverse methods were used to study this case: literature review, interviews, participatory research, structured discussions and evaluation. Since 2001, the ministry has undertaken numerous activities such as the creation of various platforms (transition arenas) and an evolving transition network, development of transition visions, images and transition paths, funding of various experiments and projects, a wide range of workshops, lectures, debates and such, and a number of evaluation and reflection processes. This approach is based on the notion of transition management and has led to an innovative policy process that has also impacted (parts of) the ministry and its practices. The process itself is an example of how the transition management approach can lead to innovative networks and agendas, while at the same time 'transitionizing' (see Chapters 6, 8 and 10) the institutional context in which it takes place. This means that engaging in transition management has led to what is called 'policy learning', which is illustrated by changes in internal organization, development of new policy instruments and new coalitions.

This process is relevant for this thesis for a number of reasons. First of all, because it is explicitly based on transition management. Secondly, because my involvement was that of a participant and observer and not (like it was in Parkstad Limburg) as organizer and coordinator. Thirdly, because the process was reflected upon and documented and a number of studies regarding the process have already been undertaken. In fourth place, because this process is seen within the research- and policy-community as an example of how transition management

could be operationalized. Because of these reasons, it makes it an adequate case study to reflect upon the use of transition management as a new policy approach from within existing (regime) institutions. It can also be used to reflect upon the difficulties of implementing transition management in terms of introducing a radically different style of policy-making in a regime-context, and upon the possible added value of the transition arena methodology. The case study is based on literature and policy-document review, participatory research, evaluation workshops with experts and government officials and a limited number of applied research/consultancy projects.

2.8 Schematic overview and synthesis

This PhD-research was a semi-structured process. Although it had a general orientation and ambition (developing and operationalizing transition management), the research process itself was not structured, nor were the specific outcomes defined beforehand. Only afterwards, was it possible to schematize the research process and clearly indicate where concepts and models originated from. In structuring the research process and its outcomes, however, it is important to realize the chaotic nature of the research process and the benefits this offered in terms of original ideas, innovative concepts and models and unexpected results. In that sense, more structure is suggested in this chapter than has actually been the case in this PhD-research.

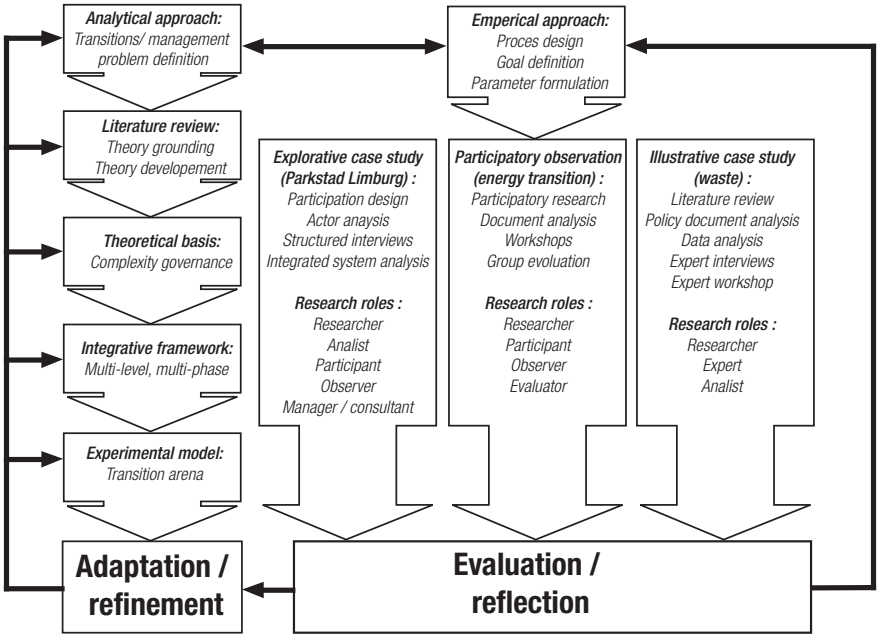


Figure 2.2 Thesis research process

In general, this PhD-thesis offers three different new corner-stones for transition management: the theoretical basis (complexity governance), the transition management framework (for operationalizing transition management in a specific societal setting) and the transition arena model (developed to address societal transitions in a predevelopment phase). The theoretical basis was primarily inspired by and based upon literature review. The transition management framework originated from practical experience, although its starting point was a theoretical idea. The multi-phase dimension of the framework arose from experiences in Parkstad Limburg and reflection upon the energy transition policies. The multi-level dimension of the framework was first formulated in the context of the waste transition case study and then applied and further refined in the analysis of the energy transition. A schematic overview of the research approach and methodology is given in Figure 2.2.

Chapter 3

Complexity, society and governance

3.1 Introduction

In this chapter we lay the theoretical foundations for the transition management approach defined in Chapter 4. As described in the previous chapter, this theoretical basis is constructed through a multi-disciplinary literature review and analytical generalisation and reasoning. The theoretical foundations described in this chapter are derived from the literature, but also partly based on practical experiences and evaluation of case-studies (Chapters 7, 8 and 9). In other words, theoretical ideas were derived from studying the literature as well as based on observations of and experiences with actual projects and processes. What is presented in this chapter is a theoretical underpinning of the transition management approach, which is one of the results of this thesis research. Initially, this thesis set out to develop transition management as a new mode of governance, focusing on interaction processes, networks and different modes of governance. Soon, it became increasingly clear that such a mode of governance should be based on a coherent and analytical perspective on societal structures and societal change. Such an integrated perspective is necessary to define the starting points for transition management, but it is also illustrative for the worldview behind transition management: it views society as a patchwork of complex societal systems with specific dynamics and patterns. Actors, physical and immaterial elements interact and co-evolve with each other and with societal structures producing gradual or radical change.

That our society is indeed a complex society and that this is not a trivial statement, is illustrated by three levels at which this complexity manifests itself: the level of society as a whole, of the problems facing our society and of dealing with these problems (governance). Trends such as internationalization, informatisation, integration and individualization have led to the emergence of the network-society (Teisman 1992; Castells 1996) and an increasing societal complexity. This development has led to the emergence of a new type of problems at the societal level, which cannot be solved with simple, short-term solutions. These problems are defined as persistent problems: they are unstructured (Hisschemöller 1993) and highly complex because they are rooted in different societal domains, occur on varying levels and involve various actors with dissimilar perspectives, norms and values. Solutions to such problems are not given and purely analytical approaches will not suffice.

Policy-making itself has become highly complex in the context of these persistent problems, as different actors and perspectives need to be dealt with and clear solutions or mechanisms to assess progress and success are lacking. Dealing with persistent societal problems will require approaches that give special attention to learning, interaction, integration and experimentation, since every implemented solution will reflexively lead to changes in the societal structures, in turn transforming the problem itself. The reality of policy-making has become that of governance; structuring and coordinating seemingly autonomous interactions between different actors at different levels that produce and reshape societal structures. The traditional policy-making paradigm of developing plans, strategies and implementing these in a rather straightforward manner has to be replaced by a more holistic, refined and integrated perspective on policy-making

The apparent need for an integrative approach towards both the persistent problems and the necessary long-term governance is currently not addressed in policy sciences. Existing models and concepts of policy processes are predominantly analytical, as they either assess coordination and organization failures of existing governance systems or postulate ideas for improving these. They do not, however, offer a new model for governance of societal change in the context of sustainable development. Here, sustainable development is defined abstractly as a development on the long term towards a balance between welfare (economic), well-being (socio-cultural) and quality of life (environmental). This definition implies a balancing act between long- and short-term, between different societal domains and between different levels of scale. It is these general characteristics of this definition of Sustainable Development that make it an effective normative starting point for thinking about long-term governance, because obviously governance or any form of steering and management is intended to promote more effective, efficient or societally desired solutions.

In this chapter complex systems theory is introduced as a promising basis for conceptualizing and influencing such long-term, complex (societal) processes. We will link complex systems theory to theories on social change and societal complexity and to the field of governance studies. Parallel insights from these different scientific fields then provide the basis for formulating starting points for complexity based governance. The starting point is the general theory of complex adaptive systems, which will be introduced in section 3.2. This provides a general theoretical framework for thinking about dynamics and change in complex systems. This framework will then be applied to societal systems, integrating theory on complex adaptive systems with sociological theories on social change (section 3.4). Finally, we will address the key question of how societal complexity is dealt with in terms of theories on management and coordination (e.g. governance) in section 3.6. Integration of these three scientific streams provides the basic starting points for formulating a theory and concept of transition management as a way to coordinate and influence complex societal change processes (section 3.8).

3.2 Complex adaptive systems

'Systems theory' and 'systems thinking' are very general terms and refer to a universal language to address complex patterns of interaction between different components. 'Systems thinking' has quickly gained popularity during the 1990s in the context of organizational sciences and management practice, but has since then been introduced in a number of disciplines. Often linked to the evolutionary or co-evolutionary perspective, system theories have emerged in one form or another as a useful analytical approach in sociology (Giddens 1984; Luhmann 1984), economics (Boulding 1970; Allen 2001), ecology (Gunderson and Holling 2002), organizational and policy sciences (Vickers 1965; Kickert 1991; Van Twist and Schaap 1991) and organizational sciences (Senge 1990). Recently, the approach has been explicitly introduced into governance and political sciences (Rotmans et al. 2001; Kemp 2005) through the concept of transitions and transition management.

Systems thinking originated in the context of technical closed systems in the 1950s. General systems theory and Applied systems theory (Von Bertalanffy

1956; Midgley 2000) linked 'systems' to '(organized) complexity' through the introduction of concepts such as feedback and generic patterns, which enabled dealing with complexity in specific systems. In these theories, complexity was seen as a specific characteristic of a system (as opposed to simple systems) instead of a condition. Later on, under the influence of scientific disciplines such as biology, economics and mathematics, new mechanisms were attributed to complex systems. Examples here-of are: dissipative structures, bifurcations (Prigogine 1987), nested structures (Simon, 1962 in:(Midgley 2000), adaptivity and path-dependence (Gell-Man 1994), co-evolution and self-organization (Holland 1995; Kauffman 1995). These are all concepts that have been introduced since the 1960s to gain better understanding of the dynamics of so-called complex adaptive systems, whereby *co-evolution, self-organization and emergence* seem to be core concept which we will explore further.

Complex adaptive systems are strongly associated with ecological and evolutionary studies (e.g. Gunderson and Holling 2002) since similar systems-dynamics are observed in both fields of study: emergence, co-evolution, feedbacks, variation and selection etc. The Darwinian paradigm of continuous gradual evolution is not supported by studies of complex ecological systems (Gould and Eldredge 1977; Gould 2002; Gunderson and Holling 2002). Such studies, along with similar studies into complex-systems dynamics in other fields, suggest a model of punctuated equilibrium; short periods of revolutionary change that interrupt longer periods of gradual incremental change. Although this model is contested in the field of ecology and evolutionary biology (evidence is surfacing that supports the punctuated equilibrium thesis), it seems useful as a model to reflect upon processes of change as non-linear development trajectories. The phenomenon of rapid structural changes leading from one dynamic equilibrium to another has been studied in many scientific disciplines.[1] Taking a complex systems perspective, transitions are fundamental changes in a system structure, generating new and relatively stable structures.

Co-evolution and adaptation

Co-evolution refers to the interaction process between different systems (-elements) through which these adapt to one another. The interaction is reciprocal: the developments are adjusting one another back and forth over time. One of the possibilities is that the interactions become irreversible. In 'normal' condition, a system is in dynamic equilibrium with its environment, constantly adapting its structure and organization to internal and external changes. The system as a whole adapts to (changes in) its environment because of the capacity of the individual components to respond to changes in their environment. The environment of complex adaptive systems, however, is also made up of other complex adaptive systems, all competing for resources. This means that a complex adaptive system is co-evolving with its environment, where both competition and cooperation are at work; interactions within the system lead to incremental, evolutionary changes. Complex adaptive systems thus change because of internal (often small-scale) changes out of which patterns emerge, or because of external

1 Originally used in the term ''demographic transition', the transition concept has been applied in psychology, organizational science, biology, chemistry etc. (see also Gersick, 1991).

changes in the environment (landscape). Co-evolution in that sense refers to the path dependence that arises from mutual adaptation between system components and between system and environment. Such processes are subject to self-organization, meaning that the observed order emerges spontaneously out of the interaction between the elements and is not imposed by a higher being. The emerging order itself is constraining the degrees of freedom (Prigogine and Stengers 1984).

Self-organization

The co-evolutionary, adaptive characteristic gives the system the property to self-organize (Rotmans et al. 2004). Self-organization in the purest sense of the word means the emergence of order without external control (Nicolis 1989). When a complex system is at the edge of chaos, these changes may occur easily and spontaneously (Holland 1995; Kauffman 1995). The occurrence of crises (or catastrophes) is an important characteristic in the behaviour of complex adaptive systems. Crises are small periods during which relatively big changes occur. Although there are small and big crises, they always have a profound impact on the structure of the system in question, either favourable or unfavourable. In complex physical and biological systems, it is found that due to external driving forces and internal interaction forces, a system evolves and self-organizes into a state with a complex, but rather general structure (Jensen 1998). Bak (Bak 1996) argues that although the dynamical response of systems to external and internal forces is complex and often chaotic, the simplifying aspect is that statistical properties are described by simple power laws. In other words, without any significant 'tuning' or steering of the changes in a complex system, it self-organizes towards a certain state of dynamic equilibrium. This state is referred to as self-organized criticality.

Another important concept to mention here is 'attractor' or 'attractor basin'.[2] This refers to a certain state in which a system sets itself and is hard to get out of. This is the state of dynamic equilibrium, in which minor variations and changes can occur (spontaneous and self-organized) as a response to internal innovations or external pressures, but these variations do not alter the general structure of the system so that it remains in its domain of attraction. Only when a system develops such a crisis or the external pressure is too high (a shock to the system), can the general structure of a system dissolve, leading to a chaotic behaviour and structure of the system. This chaotic pattern is only left when a new evolutionary direction is found and the system self-organizes again towards a new attractor.

Emergence and scale

Emergence refers to the upcoming of new patterns. This notion of the so-called emergent properties of a system has been subject to scientific and philosophical debate about its nature. At the one end of the pole it is claimed that properties at higher levels of organization have an ontological existence, e.g. that there is

2 The term was originally put forward by Lorenz, one of the founders of chaos theory, who found that in some cases chaotic behaviour (in for example describing the behaviour of a pendulum or a pile of sand) took place on an attractor.

a new kind of sphere that comes into being. At the opposite pole there is denial of emergence: when higher order patterns emerge as a surprise, the observer did not observe very well. In between the two poles, there is the standpoint of epistemological emergence (Easterling and Kok 2002). This is based on the fact that it appears to be impossible to understand the "global" behaviour of a complex system by analyzing the "local" behaviour of the individual parts. In a sense, this implies that possibly the dynamics of complex systems need to be defined according to level of aggregation or scale; the behaviour of individuals is by definition different from the dynamics of networks and from the dynamics of entire systems. Following this perspective, analysis of emergent dynamics in complex adaptive systems can only be done in qualitative terms.

Cross-scale interlinkages are an important feature of complex adaptive systems as they link different regions together that at first sight are located at large distances. They also lead therefore to surprising changes and unforeseen developments. In complex adaptive systems, there is interaction between fast and slow dynamics at different levels of scale. Dynamics at a particular system-level are resulting from interaction between developments at lower systems levels. The emergent properties as such constrain lower-level interactions by reducing the freedom to any kind of actions to scale-up. In other words do formed structures limit the possibilities for innovations from lower (or: less aggregated) levels of scale to mature. However, complex system theory suggests that sometimes upwelling novelties and bifurcations may disrupt these relationships between levels of scale and (fundamentally) alter dominant structures. From a system perspective, it seems promising to explore patterns of interaction between different levels of scale and how these different patterns lead to different types of emergence and in general system change (De Haan 2006).

The properties of complex adaptive systems are summarized in the following table (Van der Brugge 2005):

– Many and divers components and interactions.
– Components are organized in a network configuration.
– System is open (exchange of matter, energy and information with external environment).
– Non-linearity.
– Positive and negative feedback loops (reinforcing and dampening mechanisms).
– Nested organizational levels.
– Multiple attractors co-exist (relative stable but dynamic equilibrium states).
– Attractors have stability domains, bounded by thresholds.
– Components are able to learn and respond to the environment by changing behaviour (interactions).
– Co-evolutionary interaction patterns may lead to irreversible pathways.
– Higher level structures spring into being as result of lower level component interaction.

Table 3.1 Properties of Complex Adaptive Systems

Transitions in complex adaptive systems

With regard to the dynamics of a complex adaptive system, the following pattern can be discerned. A complex adaptive system continually changes and is never at a standstill. A dynamic equilibrium means a constant process of incremental

adaptation: reconfiguration, modification, revision and re-ordering within a certain attractor. Relatively long periods of equilibrium are alternated with relatively short periods of radical change, which we call punctuated equilibrium (Eldredge and Gould 1972; Gersick 1991). This is in contrast with the traditional, pervasive paradigm of incremental, cumulative change that has been strongly influenced by Darwin's theory of evolution as a slow stream of small mutations, gradually shaped by environmental variation and selection into new forms. Punctuated equilibria are not smooth trajectories towards pre-defined goals, but whimsical trajectories with high levels of unpredictability. Complex adaptive systems do not evolve gradually from one state to the next and do not necessarily evolve from a worse to a better state, through a generic sequence of stages. Transition dynamics of societal systems are a particular case of this complex systems dynamics (Rotmans et al. 2005).

Transitions occur when the system and its environment are somehow growing apart. In the pre-development phase of a transition, (large scale) trends at the macro-level and the dominant configuration (regime) are growing out of sync. Upward pulses (novelties, innovations) from the micro-level emerge more or less in accordance with the changing macro-landscape. These developments may potentially alter the equilibrium, however, the regime inhibits them to penetrate the system due to strong feedbacks between the regime and the niches at the micro-level that are constrained by the regime. The regime often inhibits change while it is concerned with the reproduction of its own organization. The regime maintains social standards and institutions, belief systems and power relations, improves existing technologies and protects investments. A shift from the equilibrium dynamics of the regime results from an emergent phenomenon that puts pressure on the regime from both a changing macro-environment and innovations perturbing the regime from within. As a result, parts of the regime are influenced. These regime developments co-evolve, which eventually leads to a further breakdown of regime constraint over the micro-level. In turn, pressure from micro-level then is able to increase, which causes an increasing speed of change. In the process the regime is forced to self-organize to undo the pressure, which in turn reinforces the emergent process. This tends to be a co-evolutionary process, which becomes irreversible as a new organization is built and some old structures are broken down. The take-off phase is thus reached when in the emergent phenomenon a modulation of developments takes place between the micro- and macro-level and puts pressure on the regime that starts to self-organize as a result. During the take-off phase the process of emergence is still competing with the regime, but due to co-evolving developments, there is no way back to the old equilibrium anymore. The acceleration is thus reached when the process as a whole becomes irreversible as a result of the many interactions, and a new phase of reorganization of the internal structure of the system is inevitable. The dynamics within the dominant regime increasingly modulate with innovative experiments at the micro level. This is a highly uncertain period in which results are needed to win over and weaken the regime at the same time. If these results are not produced, there is a danger of a drawback and the transition could suffer from a lock-in. In the acceleration phase, large-scale self-organization alters the regime fundamentally. The regime, then, plays an enabling role through the application of large amounts of capital, technology and knowledge. In short, the regime as a whole changes as a result of self-organization in response to an

emergent process, which results in 'bottom-up' pressures from the micro-level and 'top-down' pressures from the macro-level. Through the reinforcement of developments at the three different levels, dominant practices change rapidly and irreversibly. In the stabilization phase the self-organization slows down as the new regime develops and in turn constrains the micro-level. The stabilization phase represents another (relative) equilibrium, which could accommodate the seeds of change for another transition.

Based on the aforementioned ideas, a cyclical mechanism of transition unfolds: first, the system in question evolves in the direction of a certain attractor, using resources from a preceding phase; then the system settles with a dominant regime that uses the majority of the available resources and there is a stable system state within the influence area of one attractor; after that, the internal structure of the system changes as well as the environment of the system, causing tensions between the system and its environment, leading the system to a critical point: a crisis appears, a highly instable and chaotic but relatively short period; the system then reorganizes itself, resulting in a fundamentally different structure and a new regime with new resources, heading for a different or adjusted attractor, where the overall complexity has increased, or alternatively, the system is not able to recover from the radical internal and external changes and dies out. Transitions in complex adaptive systems are thus co-evolutionary by nature; they result from interacting developments in different domains (horizontal co-evolution) and between different levels (vertical co-evolution). The defining system dynamic that 'causes' a transition is called modulation (Rotmans et al. 2001).

3.3 Relevant observations from complexity theories

Leaving for the next chapter the translation of the observations derived from complex systems thinking and transitions into principles for governance or even prescriptive guidelines, we here abstract the general observations to which we will return in paragraph 3.9. These observations are:

- *Dynamics at the systems level are important*. Unintended side effects and adverse boomerang effects can only be recognized and predicted at the system level, incidentally without excluding surprises as a result of adjustments. This implies adjustments at various (functional) scale levels. A complex, adaptive system cannot be directed from just one scale level; it has too many emergent properties: properties that are (still) hidden at a higher (or lower) scale level but are already beginning to emerge at a lower (or higher) scale level.
- *Future states of a system and the path of change are highly uncertain*. Due to the large impact small variations can have, as well as because of external surprises or internal innovations (emergence), the course of development of a complex system cannot be known.
- *The dynamics of the system as a whole are important*. Understanding the internal dynamics of a complex system, more specifically the dynamics at different levels and their interaction, determines the amount of influence external pressures and/or internal innovations can have on the structure of a system. The possibilities and strategies for influencing the system as a whole are thus directly linked to the state of a system.

- *A complex system goes through phases*. Because of continuous adaptations, emerging new patterns and structures, and other shock wise changes, complex systems change in a non-linear way. For example the nearer one is to a critical point in the system, i.e. on the dividing line between two attractors, the more room there is for innovation and for radical change. Crises are not necessarily negative and they can create room for manoeuvre towards a favourable attractor.
- *(Radical) innovation comes from outside a dominating structure*. Only because of external force or because of innovations from outside the 'regime' can a complex system enter a chaotic period of re-organization and possibly find a new attractor. The fact that such a transition only occurs under very specific and favourable circumstances is also an indication for the persistence of dominant structures.

3.4 Societal complexity and complex societal systems

Obviously, 'natural' systems dynamics such as emergence and self-organization are limited and directed by specific characteristics of societal systems in which actors (organizations and individuals) operate such as free will, power, institutions and regulation. Societal change arises out of the interaction between actor and structure (Giddens 1984) and practices (Rotmans 2005) and is thus to some extent the result of conscious decisions and actions of actors. For example, small group of newcomers might build up niche regimes that are able to break down the incumbent regime and ultimately establish a new regime. Here we define a regime as a conglomerate of structure (institutional setting), culture (prevailing perspective) and practices (rules, routines and habits). In applying the complex systems paradigm to societal complexity, we need therefore to take into account sociological concepts.

In this section we will try to link the formalized, deductive abstractions of complexity theory and social theory on societal complexity. The rationale for this is that transitions can be viewed as societal processes in which co-evolution between structures, actors and practices occurs. Structure emerges from the (intended and unintended) effects of acting, whereas structure contributes to the determination of practices that form a means for acting of societal actors (Grin 2004). Giddens (1984), Luhmann (1995) and Beck (1992) all take societal complexity as a starting point although from various perspectives and scale levels. Here we see remarkable similarities between complexity theory and social theory in terms of using similar concepts, although often named differently. Luhmann (1995) studied variation and selection, autopoiesis and self-organization, Giddens (1984) discusses emergence and co-evolution, while Beck (1992) focuses on uncertainties, discontinuities and risk. Obviously, we cannot transpose concepts of complexity on a one-to-one basis to societal systems. For this, notions such as power, (un)willingness, fear and emotions play a too important role and we therefore first have to trace sociological concepts that mirror complexity concepts.

Throughout sociology, societal complexity has been acknowledged and generations of scholars have tried to develop concepts that capture this complexity in different ways and at different levels. Examples are societal systems (Luhmann

1984), the network-society (Castells 1996) and the risk society (Beck 1992; Beck 1999; Van Asselt 2000), but also on a more specific level, different examples of the complex interaction patterns between agents and their environment can be given (Coleman 1994). They all relate to the intricate nature of societal change and the dynamics that drive it (e.g. (Durkheim 1947; Elias 1978; Vickers 1983; Giddens 1984). Interestingly enough, the idea of systems or systems thinking has been present in sociology since its origin (although not yet explicitly, Durkheim already described the development of society from a simple hunter-gatherer society into a complex industrial societal system). An example is to be found in the work of Vickers, who used the systems perspective to study policy-making and later on shifted his focus towards understanding what he called 'human' systems. He used insights from ecology and systems thinking to analyze and describe human (what we call societal) systems. Following his publications on this subject, Vickers observed that: all human systems also are ecosystems since they have a relationship with the real world; human systems are also to some extent man-made systems; even man-made systems are not fully technological (Vickers 1983).

So far, systems theory has predominantly been used (parallel to the evolution of systems theory) in a very functionalist and strict sense, only slowly evolving into more differentiated use. A good example is German sociologist Jürgen Habermas, whose work has evolved from a functionalistic toward a more refined and differentiated systems approach (see for example Habermas 2003). Sociologists have limited themselves to the use of systems thinking in general in the context of societal dynamics and structures and have not yet developed explicit complex societal system' theories as basis for prescriptive governance approaches. Although we do not assume that we develop such a theory here, we can look at the striking similarities between concepts used in the different scientific fields and try to link them.

Good starting points for thinking about complex societal systems are the mentioned properties of complex adaptive systems (see Table 3.1). These properties can be applied to societal systems to support the idea that society can be seen as a patchwork of functional complex adaptive systems. In general, societal systems are composed of numerous components and a multitude of interrelations. These components could be actors, structures, institutions, artefacts or even cognitive elements. These elements interact and form networks of relations, either in terms of socio-technical (actor-) networks (Latour 1992; Law 1992; Callon 1999), human (Vickers 1983) or societal systems (Rotmans 2005), in a reciprocal relationship. This refers to the understanding of social theory that societal structure is both the result of and condition for action. Structure emerges from the (intended and unintended) effects of acting. Once it exists, it contributes to the determination of rules and means for acting of societal actors (Giddens 1984; Grin et al. 2003). In this context, social change is understood as a result of the interaction between different actors, structures and practices, whereby so-called artefacts (e.g. technologies) play a mediating role and can be seen as part of the structure. Remarkably, radical change is not often subject of research in social sciences (although in general evolution is), while in socio-technical studies it is one of the main topics. Theories on social construction of technology (Bijker et al. 1987) and evolution of large socio-technical systems (Geels 2002; Kemp and Rotmans 2005) are useful in this respect to conceptualize how individual actors

change their behaviour in co-evolution with changes in structure or with new artefacts.

The triangle of structures, actors and practices also plays an important role in Luhmann's work (Luhmann 1995). Luhmann assumes an extremely complex, rapidly changing and unmanageable reality. Social systems can bring some coherence in this complexity and based on their structure they contribute a sense of purpose to societal dynamics. Social systems fulfil societal functions: economic, political or legal. They are functionally differentiated (Luhmann 2002): the legal sub-system fulfils judicial functions, the political sub-system political functions, etc. Luhmann conceptualized systems in terms of communication between individuals and supposes that these societal systems are reinforced by repeated communication. Interestingly, Luhmann supposes that societal systems are complex systems in which order is not based on consensus about common values, norms and beliefs, except perhaps at the most abstract level. He observes that modern societies tend to become interconnected and therefore more complex. In these societies, individuals are more detached from 'the system' than in pre-modern societies, which enables them to be more flexible, have more opportunities and enjoy more freedom (Luhmann 1995). This, however, neglects the tendency of at least some individuals to long for small communities and strong social cohesion which also offers more certainties and safety.

In contrast to Luhmann, Giddens researches the dynamics more from the viewpoint of agency than from a systemic perspective. He does consider the dynamics of the regime and with this the associated structural changes, but he is particularly interested in how practices are consequences of the interaction between agency and structure. And with this he operates more at the micro level, where structures form the condition for the acting of agency (actors). Structure is conceptualized in terms of rules and resources that actors use and therewith reproduce structure. This theory of structuration has recently been revived by Stones (Stones 2005), who argued for what he called 'strong structuration', a less conceptual and more precise and narrow definition of the duality of structure and its use as analytical frame, which also takes into account more precise definitions of structure in terms of material or non-material artefacts or entities. Agency is in structuration theory defined as the actions of agents, rather than their interests, intentions or purposes. For a large part, these intentions are unconscious or at least diffuse, which underlines the need for taking into account irrationality, intuition, trust and other psychological factors. Since both these motivations and actual societal structures are impossible to analyze in a strict sense, we can only judge or analyze actual perpetrations of actors in order to understand the dynamics of agency.

For Luhmann, structures of social systems are conceptualized as the communication and exchange of knowledge between actors. These structures reinforce themselves and evolve quasi-autonomously. These structures are the decisive factor for the dynamics of social systems. Structures determine how the actors can act, but the structures themselves are also subject to change, notably through the changes in functions that the structures fulfil. The social systems researched by Luhmann are in his view often (relatively) closed, because they filter the information from the surroundings that is allowed to enter the system, making management from outside all but impossible. Using the approach of a relatively deterministic structure of social systems Luhmann works mainly at the meso

level: there is little attention to any change of structures from within due to the dynamic behaviour of the actors. In his later work, Luhmann uses the term 'autopoiese' in his social systems theory, a phenomenon that was discovered by Varela and others (Varela et al. 1974). Autopoietic systems create themselves: structures create their own structures in order to survive. Social systems are therefore self-selecting, self-referential and self-creating. In other words, in transition terminology this is how a regime attempts to maintain itself through incremental adaptation and innovation.

In comparison with Luhmann and Giddens, Beck (Beck 1992; Beck 1999) considers the triangle of structures, actors and practices mostly from the macro-perspective. He takes global dynamics as his starting point, whereby all kinds of surprises and discontinuities creep into social systems, which can have a significant influence on the interactions between structures, actors and practices. He points out the hazards of the risk society, where many uncertainties and risks creep into our systems and where we have the inclination to control the 'small' risks and to ignore the 'large' risks. In complex systems terminology, what we call surprises or crises are often either symptoms of the tensions between a systems structure and the environment, or the result of unpredictable emergent developments at sub-systems or lower levels.

Combining these insights leads to an integrated perspective on the drivers of societal change or in general on how society is structured and ordered. Social structures are, following sociological literature, the result of individual as well as collective and of conscious as well as unconscious (or unplanned) action. To reformulate in transition terminology, change is always the result of conscious planning, emergent trends, innovations and autonomous individual action. Based on this perspective, we distinguish three mechanisms that lead to order in society in which actors play a substantial role: hierarchy-based, market-based and society-based. Obviously, there is no central steering entity or influencing body that can fully control social change, although individual actors or institutions can have a profound impact on society. A clear example is a government organization that is capable to enforce specific action through regulation and investment, but is unable to control society as a whole. To some extent however, hierarchical structures, within and between organizations and institutions, provide structure and meaning to everyday practice and create stability in social interactions. Markets on the contrary are hard to manage or regulate fully and have a strong autonomous dynamic. They do lead to societal structures and efficient provision of specific societal functions, although in a different way than planning does. Market based ordering mechanisms are most visible in sectors or systems with a strong international character, a very diffuse or emergent structure or with a very complex and competitive nature. The third mechanism of social structuring is captured with the term 'civil society': individuals interact in networks, develop societal perspectives and agendas and thus influence planning and markets. Societal change in general is then the result of the interplay between top-down and bottom-up dynamics and between dynamics at different, (geographical and functional) levels of scale. This interplay determines the direction and pace of development. These different societal structuring mechanisms are visualized in Figure 3.1.

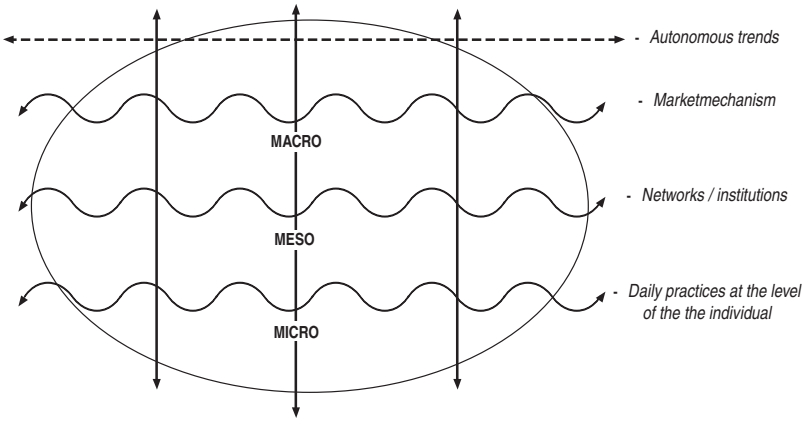


Figure 3.1 Mechanisms of societal structuring

Key point here is that societal structure is the result of complex and interacting mechanisms and thus of different forms and styles of coordination and governance or action. By acknowledging the complexity, but also the diversity of perspectives and theories on societal change and steering or action in this context, we need an integrative perspective on society which incorporates this pluriformity and enables structured and context-dependent analysis of patterns of change. Different sociologists mentioned before have developed such integrative perspectives which, as we have illustrated, from the perspective of transitions only address part of the complex nature of these processes. In general, integrative perspectives developed in the past are often formalistic, deterministic and linear or they are too abstract. Examples are the explanatory theories of Giddens and Luhmann or thematic theories on power or institutions (e.g. Foucault, Bourdieu, Vickers). Although such theoretical perspectives have greatly added to our understanding of different mechanisms that lead to stability and change in society, it seems to be difficult to translate this understanding into a coherent governance strategy to deal with long-term change in complex societal systems. As presented in the previous section, the complex adaptive systems perspective seems to provide the necessary framework that allows us to include all characteristics of societal complexity, such as heterogeneous agents and artefacts, dualism of structure, emergence, surprise and uncertainty. The analytical perspective of complex adaptive systems therefore seems very adequate to describe and analyze societal systems, while building on insights from sociology.

We thus view society as a patchwork of complex adaptive systems. A societal system is defined as a conglomerate of different actors, (material and immaterial) structures and practices across multiple levels and with a long time-horizon. This definition is very open, because the distinction, demarcation and analysis of any societal system is a subjective exercise and can never lead to a fixed demarcation. How a system is defined thus depends on processes of social construction, which also means that a societal system is in part defined by how recognizable

it is as a system for actors involved in the system. In practice therefore, societal systems are often defined at the level of sectors or specific societal function such as energy (-sector), agriculture or mobility (-sector). A societal system can be characterized by the way in which economic, socio-cultural as well as environmental and nature functions are fulfilled (Rotmans et al. 2000). Socio-cultural functions include housing, health, food or recreation. Examples of economic functions are transport, communication, business services, production and energy supply. Nature and environmental functions are partly the functions that nature and the environment can have for society, such as provision of resources, space, air and water, but it also relates to functions for guaranteeing the vitality of nature and the environment, such as waste management, water management, water purification and soil sanitation (Rotmans 2002). Besides sector or functional demarcations also a geographical demarcation can be chosen such as large cities or regions. This approach differs from the Luhmannian approach towards societal systems, in the sense that we perceive societal systems as fulfilling specific societal functions.

From this complex adaptive systems approach towards societal systems follows that the perceived system critically depends on the observer and the level at which the coherence is observed. According to Checkland (Checkland and Scholes 1990), the 'hard systems approach', which presents societal systems as systems with clearly defined goals and objectives, has limited applicability, since this is clearly not the case in societal systems. Checkland's critique opened the door for a more self-consciously 'critical' attitude to system approaches and models. This led to the use of more 'subjective' and conceptual system models to capture the possible perceptions of the world (Grosskurth 2007) to structure debate among stakeholders. In these qualitative system models, the objective is first and foremost to demarcate and value a system in a participatory process. Such systems approaches towards societal change, and ultimately governance, can at best be an analytical instrument to support participatory decision-making processes. This however does not rule out the possibilities that modelling as such can contribute to a conceptual systems approach by means of a much more precise and detailed analysis and conceptualization of the dynamics in a system (Schilperoord et al. 2006).

Any focus on a societal system or sub-system is therefore arbitrary; there are no objective borders between these sub-systems. In other words, societal systems are also open and exchange interactions, energy and components with other societal sub-systems. This means that there are co-dynamics and co-evolutionary processes not only within a system but also, and perhaps even more importantly, between systems. This interaction could be stimulating or counter-productive; in complexity terms there are positive and negative feedbacks. In societal systems, we can also find that a number of aggregation levels can be observed, much like the nested structures of complex adaptive systems. There are individual actors, small networks, organizations or clusters, sectors and the whole of society. Or, we could think of geographical aggregation: a specific location, a neighbourhood, a city, a region and a country. It seems obvious that there is some sort of interrelationship between such levels of scale, but much like the interrelations observed in complex systems, these interrelations are complex and hard to analyze in full. The outcomes of these interrelations are therefore unpredictable, nonlinear and emergent.

3.5 Relevant observations from sociological theories

Based on the intercomparison between complex systems and sociological notions of complexity we highlight here some of the parallels that we have noticed:

- *A societal systems approach is useful*. Although in different forms, sociologists have frequently used the concept of systems to define and describe societal interaction processes.
- *Societal change sometimes takes place in sudden steps and in a strongly non-linear manner* and is then full of surprises and discontinuities, although there are systematic patterns. These can be explained by self-organization and emergence as internal interactions within a system or by external pressures or 'risks'.
- *Major societal changes originate partly as a result of interference of interventions at various (georgraphical and/or functional) levels of scale*: not top-down or bottom-up but as a combination of these.
- *The structure (regime) paradox*: any societal structure forms a crucial link and obstruction for societal innovation while at the same time it attempts to stimulate this innovation. Structure is both barrier to and medium of change.
- *Individuals in modern societies are interdependent* and operate in societal networks.
- *Society cannot be fully constructed by government or markets alone* but is partly and shared "makeable". It is an illusion to think that the process of societal change can be controlled: the most feasible form of control is coordination and influence with an important role for beliefs and feedback mechanisms.

3.6 Governance complexity: From Government to Governance

In practice, we have witnessed over the last decades a shift from the centralized, authoritarian nation-state, towards market based and decentralized approaches towards decision making (Loorbach 2002). Due to societal developments the power of central government to make policies and implement these has decreased, leading to increasingly diffuse policy-making structures and processes (Hooghe and Marks 2001). Generally referred to by the term 'governance' (Kooiman 1993), the current practice of government in making policy is in interaction with a diversity of societal actors. At the European level for example, this development has led to multi-level, participatory decision-making structures in which regions are dealing directly with EU-offices, in which NGOs and businesses are involved in the development of policies, and in which top-down decisions are limited to the politically most controversial issues. But governance has also become common practice at the global as well as on a regional scale, where influence of non-governmental organizations (NGOs), business and science slowly becomes part of policy-making processes rather than an external force or passive subject of government.

Governing societal change, or how to structure and influence societal development in a desirable direction, has been the focus for research by public administration and political scientists and other social scientists for many decades. There seems to be an increasing degree of consensus in this hybrid research field that traditional forms of steering are not suitable for societal challenges with a high degree of complexity. Classical top-down steering by government ('the

extent to which social change can be effected by government policies') as well as the liberal free market approach ('the extent to which social change can be brought about by market forces') are now outmoded as effective management mechanisms to generate sustainable solutions at societal level. Many researchers therefore argue for new forms of governance to reduce, or better still, eliminate this lack of direction. However, governance itself is perceived to be an ambiguous development. Some authors put the emphasis on the benefits of involving stakeholders, the democratic and legitimizing benefits of interactive policy-making and the inevitable necessity of dealing with the reality of networks and diffusion of power (e.g. Kooiman 1993; Eising and Kohler-Koch 1999; Hooghe and Marks 2001; Voss and Kemp 2005). Although these authors also stress the negative effects of the shift from government to governance, they generally interpret the problems as temporary and try to conceptualize how governance could be more effective and transparent.

The inadequacies and problems of current forms of governance are exposed when we consider government failures and the need for new arrangements to give direction (see authors such as (Mayntz 1993; Scharpf 1994; March and Olson 1995; Fox and Miller 1996; Pierre and Peters 2000; Hooghe and Marks 2001; Teisman 2005). This failure is also emphasized in the light of increased societal complexity and the complex, unstructured nature of policy-making processes (see (Hisschemöller 1993; Kooiman 1993; Lindblom and Woodhouse 1993; Kickert et al. 1997; Sabatier and Jenkins-Smith 1999). All the researchers mentioned above point out the impracticability of classical top-down governance, but they indicate at the same time that there is still a need to direct complex societal dynamics.

In general they all point at specific problems related to the diminished capacity of planning and the complex nature of a networked society. Abstractly speaking, these problems are (Kemp and Loorbach 2005; Voss and Kemp 2005):

- *Dissent*
  Complex societal problems are characterized by dissent on goals and means. Different people have different perspectives on the (nature) of the problem and preferred solutions.
- *Distributed control*
  In pluriform societies control cannot be exercised from the top. Control is distributed over various actors with different beliefs, interests and resources. Influence is exercised at different points, also within government, which consists of different layers and silos, making unitary action impossible.
- *Determination of short-term steps*
  It is unclear how long-term change may be achieved through short-term steps. Short-term action for long-term change presents a big problem to policy makers. There exists little theory on this.
- *Danger of lock-in*
  There is a danger that one gets locked into particular solutions that are not the best from a longer-term perspective.
- *Political myopia*
  From historical studies we know that transitions in socio-technical systems take one generation or more and thus span various political cycles. Long-term policies in some way must survive short-term political changes.

Although it is not easy to generalize, the new forms and theories of governance developed over the last fifteen years, are characterized by a number of central concepts on how actors and institutions constitute change. These concepts (and conceptualisations) are accordingly the basis for developing steering strategies. These are: networks, interactivity/participation in policy, agendas, pluriformity, and learning.

Networks and governance

The concepts of networks and network-steering have become dominant in the field of governance of the last decade. Societal actors create formal and informal networks by interacting, for different reasons. Sometimes because they have the same vested interests and are striving towards the same objectives, sometimes because they cannot do very well without each other because they can achieve their objectives better jointly than individually. The mere fact that individuals and organizations are interdependent and interrelated in our society means that decisions and action are not individual but will always have an effect on other actors. Also, decisions that affect society in general will need to be supported by multiple actors. In complexity terms, decision making in a network context means dealing with feed-back, spill-over and unpredictability. Network steering: joint management by all interested parties within a network has become a common phenomenon (Marin and Mayntz 1991; Kickert et al. 1997; Sabatier and Jenkins-Smith 1999; Dirven et al. 2002). Networks do not have a clear hierarchical structure like institutions and organizations but, after a certain time, they can silt up and develop into institutions or organizations with the same rigid structures (Van Dijk 2001). In terms of managing networks or steering based on the idea of networks, researchers often refer to process management (Bruin et al. 1998).

A specific emerging form of network-governance is multi-level governance as observed to develop in the European Union (Scharpf 1994; Hooghe and Marks 2001). Although the idea of multi-level governance has been applied as analytical framework outside the context of the European Union (for example: Kuks and Bressers 2000), it predominantly refers to network governance in the EU (regional, national and European) in which for example regional actors can participate at the European level and vice versa. Over the last decade in Europe a system of multi-level governance took shape, more or less *de facto*. Authors such as Scharpf (1997) and Hooghe argued that the policy-making process is changing fundamentally as a result of the European integration. The chaotic and unguided process has led to a multi-level governance structure whereby at each level different actors are involved in the decision-making process, resulting in "*a polity with multiple, interlocked arenas for political contest, of which the European level is one, where state executives, but also European institutions and a widening array of mobilised interests, contend*." (Hooghe 1996 176). Although this structure has emerged autonomously to a large extent, it has generated a lot of development and discussion in relation to the democratic effectiveness and legitimacy of such governance structures. The ideal of multi-level governance is a better coordination of policy developments at different levels in a democratic way. For example, regional issues can be addressed directly at the European level and vice versa, empowering smaller groups and regional actors. On the other hand, however, policy-making has become less transparent this way; the division of power as well as the accountability issue are no longer clear.

Without being specified or being developed into a prescriptive model, the concept of multi-level governance draws attention to the nestedness of governance systems. In other words, governance itself is not independent from its surrounding environment, be it political, social or other, but is an integrated part of it. Driven by trends such as European integration, internationalisation and empowerment of societal actors, the multi-level governance structures seemingly have emerged autonomously in all sectors of the economy and society. What has been an interesting observation regarding this evolution is that multi-level governance does not seem to be equally effective in terms of problem-solving in different areas (Scharpf 1997). Scharpf concludes, based on an assessment of evaluatory studies on European governance, that different areas require different approaches based on their nature, structure and state of development (Scharpf 1997). So the multi-level approach redefines the reality of governance as taking place in a multi-level network context and opens the way for more prescriptive approaches to network-governance or interactive policy-making.

The interactive policy approach has recently become widespread as a specific form of network-management or network governance where government involves societal stakeholders in the policy making process. As a result, governments work more and more interactively, in order to activate networks and to stimulate them by means of carefully targeted incentives. The organization and design of these interactive processes itself has become subject of study (e.g. Edelenbos 1999) and has led to the emergence of the field of process- and network-management (De Bruijn 1997; Kickert et al. 1997; Eising and Kohler-Koch 1999; Milward and Provan 2000). Besides the government, other societal actors also attempt to direct a process where they have mutual influence (Bruin et al. 1998; Dirven et al. 2002). Efficient and effective interaction between the most important directing societal actors has also become an essential condition for the new forms of governance that have emerged in the past decade. A specific form of interactive policy-making has become that of participation or participatory methods (Van Asselt 2002; Kasemir et al. 2003). Participatory methods are more specific in selecting actors related to policy goals in a certain context, while interactive policy-making refers to the process of interaction between different actors in the context of policy-making in general.

Agendas

Another key concept in network-governance studies has become that of agendas (Baumgartner and Jones 1993; Kingdon 1995) and (advocacy) coalitions (Sabatier and Jenkins-Smith 1999) related to policy change. Actors organize themselves in coalitions that hold similar or shared beliefs and ambitions in order to further their agenda and objectives. Through the interaction and negotiation between different coalitions policies are made, or change. Within such coalitions, individual actors can play different roles, such as expert, communicator or networker. The basic idea is that the more effectively the different roles are fulfilled, the more impact these coalitions can have on the policy-process. However such coalitions often relate to a specific (policy) context and their practice, goals and impact will change over time. This relates to the idea of 'policy windows' of Kingdon, who states that the policy process consists of three streams: problems, policies and politics (Kingdon 1995). Only when these streams converge, can the process of negotiation and exchange of agendas and perspectives lead to

social learning and policy change. The Advocacy Coalition Approach has become a model to analyze such policy-change processes (Sabatier and Jenkins-Smith 1999), but a prescriptive concept or method on how to influence or organize such processes effectively has not been developed.

Pluriformity

The concepts of agendas and coalitions relate both to the idea of a network society and to the idea of diversity and pluriformity of perspectives, interests, goals and needs. Each form of direction that is focused on societal complexity should take into account this pluriformity of a wide range of societal parties. This demands a pluralistic approach that assumes the basic principle of plurality of interests and values for coordinated action in such a way that the compliance of all actors involved is achieved (Eising and Kohler-Koch 1999; Grin 2004). This implies an attempt to clarify the different perspectives (systems of norms, values, motives and perceptions) of the parties involved (stakeholders) (Rotmans and De Vries 1997). At an abstract level, these different perspectives can be linked to worldviews and their according management style (Thompson et al. 1990). Thompson et al (Thompson et al. 1990) distinguish different stereotypical perspectives (such as egalitarian, individualist, fatalist and hierarchist) which perceive reality totally differently in terms of vulnerability and the extent to which humans can influence the world. Based on these worldviews, the different perspectives also include either more top-down or bottom-up management approaches. Without using such a typology in a prescriptive way, it emphasizes the importance of acknowledging pluriformity and diversity amongst different stakeholders. Agreement on collective issues and goals from this perspective can only be reached when there is a sufficient degree of convergence of the parties' perspectives on a specific solution for a multi-actor issue. This, however, is not by definition a consensus on all values, norms and beliefs (a similar point was raised by Luhmann), but rather an agreement on a very abstract level: the existence of a specific, shared, problem and the consensus that there is a need to act upon this problem. Problem structuring therefore becomes an intrinsic and crucial element in policy making (Rosenhead 1989; Hisschemöller 1993; Hisschemöller and Hoppe 1996).

Learning

A final relevant concept in the context of governance and complex society is 'learning'. Social learning theories (Social Learning Group 2001; Clark 2002; Allen and Strathern 2003) have come to the forefront as a way to analyze and conceptualize social change. Often referred to as 'second order' or 'double loop' learning (Argyris and Schon 1978), social learning is about individuals, groups or organization that question and reflect on the values, assumptions and policies that drive their actions and through this change them. This form of learning about uncertainty and complexity has become an important part of societal steering processes, because the uncertainty and the increasing complexity in governance processes are often of a structural nature. This is not so much cognitive learning, but social learning – developing interaction with others from an alternative perspective on reality (Social Learning Group 2001; Leeuwis 2003). The influence of the social context on learning is often central, both in the encouraging and in the impeding sense (Loeber 2004). It is very important in such a context to

gain insight into the perceptions of others who are learning at the same time. Only when we comprehend each other's ideas, motives and vision and develop a better understanding for each other, will we be able to search together and develop a common agenda. A key feature of interactive governance processes is thus the exchange of perspectives and knowledge that leads to social learning and change in practice. Through creating stimulating contexts and facilitating the exchange of information and knowledge, social learning can be stimulated (McElroy 2002).

3.7 Relevant observations from governance theories

Based on a general overview of the existing literature, governance of long-term societal change needs to take into account that:

- *All societal actors direct*, being aware of the opportunities as well as the restrictions and limitations of directing. Through agency and interaction in networks society is shaped as well, to which we conceptually refer as 'governance'.
- *Top-down planning and market dynamics only account for parts of societal change*, network dynamics and reflexive behaviour account for other parts.
- *Steering of societal change is a reflexive process* of searching, learning and experimenting.
- *There is a strong relationship between the specific societal domain or sector and the most effective form(s) of governance.*
- *Advocacy coalitions and their agendas drive policy change*. Besides individuals and external surprises, policy change is the result of lobby groups, coalitions that utilize policy windows to influence or change policies.

3.8 Synthesizing insights: governance in a complex society

We have found so far that there are striking similarities between complex systems theory, sociological theories and governance where they deal with change and complexity. It seems obvious that comparison and integration of the three scientific streams, at least conceptually, promises to yield new insights for developing a novel steering paradigm. This steering paradigm is then based on the dynamics of complex systems, taking into account specific characteristics of societal complexity, and recent insights from the field of governance. In this final section we synthesize the insights and formulate the starting points for a form of complexity based governance which we will develop further in the next chapter. Complexity and uncertainty in this paradigm are not problems or obstacles, but are actually a means of leverage for steering of societal change. Such a perspective is not completely new, many authors have tried to identify leverage points to promote change base on a system perspective (Meadows 1999; Midgley 2000; Mitleton-Kelly 2003). What is new is that the system perspective here is explicitly integrated with insights from sociology and governance.

What does complexity as addressed in complex systems theory mean in terms of steering? It means that we do not view complexity as a problem or obstacle, but rather as a means of leverage for steering. Greater insight into the dynam-

ics of a complex, adaptive system leads to improved insight into the feasibility of directing it. In other words: application of complexity theory can result in a collection of basic principles or guidelines that can be used to direct complex, adaptive systems. Of course we cannot easily transpose concepts from complex systems theory onto societal systems and derive prescriptive rules for governance from this. We can, however, draw more general conclusions from the insight into the behaviour of complex adaptive systems and take these as starting points for governance, while realizing the limited scope and possibilities of governance or steering in the context of a complex societal system.

The overall conclusion to be drawn from the analysis of societal complexity is that uncertainties, non-linear processes of change and innovation and emergence are important features of societal change. Obviously these need to be taken into account when conceptualizing a form of governance that aims to deal with these processes in such a way that on the long-term society evolves into a desired direction. While classical and top-down forms of management, steering and organization still have a function in modern society, the complex networked society requires additional strategies and approaches. A Dutch public administration expert (Kickert 1991) has drawn lessons for management of complex, adaptive systems, even though these were relatively abstract and fragmented. In the meantime, complexity theory has evolved further (though the theory is still far from mature) and more empirical knowledge has been gained from practical experience with the management of complexity (Rotmans et al. 2001; Geldof 2002; McCarthy 2003; Loorbach 2004).

The general conclusion from the theory overview is that there is a huge variety and diversity of concepts, analytical models and theories existent which seem to provide at least some of the jigsaw pieces. None of the mentioned sociological or governance theories seems to address the full societal and steering complexity in terms of multi-level, multi-phase, multi-actor and multi-domain in a prescriptive manner. However, we have found that in almost all theories and concepts touched upon here, different elements are provided for such an inclusive form of governance. Such are: actor-network interaction, of different levels of scale, of different social domains with specific characteristics, of the plurality of actor perspectives and the new instruments, practices and approaches that emerge within the field of steering and government.

Complexity observations	**Sociological observations**	**Governance observations**
System level	Societal systems	Societal domains
Uncertainties	Non-linearity social change	Complex networks
System dynamics	Multi-level dynamics of societal change	Multi-level structures
Phases	Punctuated equilibria	Policy streams
Outsider innovation	Structure and agency	Agendas, all actors direct
Emergence and co-evolution	Partly makeable	Steering is a reflexive process

Table 3.2 Related observations

When we compare the key observations drawn from the three scientific streams conceptually (see Table 3.2) and generalize analytically, it seems that these can be related to one another in a complementary manner. A shared message seems to be that there is a relationship between the nature of a 'system' and the dynamics. This would imply that any form of organization or governance needs to take into account the ongoing dynamics of the subject at hand as a basis for steering and action. In terms of our topic, persistent societal problems, this would imply taking into account the dynamics on different levels, in different domains and over a longer period of time as starting point for governance. This is why the transition concepts of multi-level and multi-phase, linked to the notion of sustainable development as integral societal concept provide a good framework to start from. Complexity theory and concepts can additionally be used to further analyze the specific societal trends and developments. Conceptually, based on this complex systems approach to governance, governance should be based on the following starting points.

3.9 Starting points for governance based on complexity theory

1 The dynamics of the system create feasible and non-feasible means for governance: this implies that substance and process are inseparable. Process management on its own is not sufficient – insight into how the system works is an essential precondition for effective management. Systems-thinking (in terms of more than one domain (multi-domain) and different actors (multi-actor) at different scale levels (multi-level); analyzing how developments in one domain or level interact with developments in other domains or levels) is necessary to be able to take into account such possible means and leavers for governance.
2 Long-term thinking (at least 25 years) as a framework for shaping short-term policy in the context of persistent societal problems. Since societal transformations take long-time periods and long-term system dynamics are more important for understanding the nature and direction of transitions, the link between long- and short-term is inevitable. This means processes of back- and fore-casting: the setting of short-term goals based on long-term goals and the reflection on future developments through the use of scenarios.
3 Objectives should be flexible and adjustable at the system level. The complexity of the system is at odds with the formulation of specific objectives. With flexible evolving objectives one is in a better position to react to changes from inside and outside the system. While being directed the structure and order of the system are also changing, and so the objectives set should change too.
4 The timing of the intervention is crucial. Immediate and effective intervention is possible in both desirable and undesirable crisis situations. From complex systems thinking it follows that periods of crises offer opportunities for alternatives to break through. Alternatively, periods of relative stability imply that governance should focus much more on developing alternatives and critical mass. The state of a system at any moment can thus offer certain, specific, possibilities for action.

5 Managing a complex, adaptive system means using disequilibria rather than equilibria. In the long term equilibrium will lead to stagnation and will in fact hinder innovation. Non-equilibrium means instability and chaos, which forms an important impetus for fundamental change. The relatively short periods of non-equilibrium therefore offer opportunities to direct the system in a desirable direction (towards a new attractor).
6 Creating space for agents to build up alternative regimes is crucial for innovation. Agents at a certain distance from the regime can effectively create a new regime in a protected environment. For this to happen a certain degree of protection is needed (a nucleus) to permit agents to invest sufficient time, energy and resources.
7 Steering from 'outside' a societal system is impossible by definition: structures, actors and practices adapt and anticipate in co-evolution. Opposed to how government policies are often perceived (as external steering), governance in terms of complexity is integrally part of the system it influences.
8 A focus on (social) learning about different actor-perspectives and a variety of options (which requires a wide playing field).
9 Participation from and interaction between stakeholders is a necessary basis for developing support for policies but also to engage actors in reframing problems and solutions through social learning. But participation does not need to imply that just anybody should be involved: focus should be on involving specific actors (individuals and organization) who play a specific role according to the phase of transition and the level of governance.
10 Complexity governance means creating institutional, mental, financial room for innovation, emergence and (self-) organization. This means accepting uncertainties and surprises as conditions for variation and selection processes and creating context-conditions that enhance the chances that the innovation process becomes irreversible.

3.10 Conclusion

The approach of complex adaptive systems sheds light on the evolutionary dynamics and patterns of change in systems as a result of co-evolution, emergence and self-organization. Complex adaptive systems can be used as basis for understanding systems of quite different natures, from ecological to social and economic. Systems-thinking has emerged over the last decade or so in a number of disciplines such as ecology, economics, organizational sciences and sociology as a useful analytical framework. In its most recent form, however, systems thinking has not yet been broadly applied in social sciences and more specific governance theory.

Thinking about society as a patchwork of complex adaptive systems seems a very promising starting point for thinking about governing societal change. Since societal sectors consist of numerous interlinked elements, since there is a high degree of uncertainty about their interactions and feedback and since they have an open and nested character, they seem to behave as complex adaptive systems. Therefore, similar patterns like for example emerging structures, co-evolving (policy) domains and self-organizing processes, can be observed. Argu-

ably, this complexity has increased over the last decades as a result of increased interaction, integration and interdependence.

Dealing with a complex society has also become more complex. Not only because of the societal complexity, but also because governing is no longer an individual activity of government. All actors in society can potentially influence policy making and ultimately societal change. This shift from government (centralized decision-making) towards governance (co-production of policies) is fundamental and driven by increasing societal complexity; perhaps it can be called a transition itself. It has, however, been a seemingly autonomous process, whereby government was forced step-by-step to open up their decision-making processes through stakeholder participation, interactive government, lobbying et cetera. The challenge now could be to take the societal complexity as well as the complexity of governance as a starting point for formulating new governance approaches, rather than to see these as obstacles for transparent and effective government.

The challenge lies on the one hand in a theoretical deepening of these steering guidelines and on the other hand in their application in societal systems, particularly in practical situations. The strength of complexity theory is that it uses relatively simple analytical principles to describe and explain patterns in time, space and functionality. A weakness is the parallel that is assumed between abstract mathematical systems, ecosystems and concrete societal systems. Many authors, such as for example Holling, have asserted that a one-to-one translation is not realistic although there are clearly many parallels and related concepts that need to be explored further. The elegant analytical principles of complexity theory have been applied to ecosystems and societal systems with increasing frequency in the past decade (Gunderson and Holling 2002; Allen and Strathern 2003; Walker 2004; Rotmans 2005), and seem to lead to innovative, integrated and inspiring new ideas and concepts. In the following chapters we will show that the use of complexity theory for governance holds equal promises.

Chapter 4

The transition management approach

4.1 Introduction

In this chapter we define the transition management approach by addressing central elements of transition management and how they relate to existing governance and innovation approaches. We will present the concept of transition management as a complexity based governance mode for sustainable development. Transition management is a generic governance approach that is based on existing strains of thought in governance and policy studies, but because of its integrative character, its explicit link to complexity theory and its explicit use of sustainable development as guiding principle, it constitutes a fundamentally new governance approach. Part of these insights have been derived from practical experience, which is also reflected in this chapter through a translation of well-know insights from governance, policy and innovation studies into operational and prescriptive elements.

This chapter is structured as follows. First we will introduce the basic starting points underlying transition management and how sustainable development and transitions are used as leading concepts. Next, we will try to characterize the type of governance concept transition management is in terms of how society and the role of governance and management are perceived. Then we will address how transition management deals with key elements related to long-term governance of complex societal processes: multi-actor, long-term goal setting, innovation, evaluation and adaptation and knowledge transfer and learning. Finally, we will position transition management in between top-down and bottom-up and between centralized government driven and liberalized, market based approaches.

4.2 Complexity governance for sustainable development

As we have argued in the previous chapter, complexity theory seems a promising starting point for developing a new mode of governance to manage long-term societal change. Linking the complexity perspective to relevant aspects of existing sociological and governance theories provides a generic framework for complexity based governance. This does not presuppose any specific normative goal, political agenda or organizational setting. Theoretically, the starting points for complexity based governance could be used to serve a conservative strategy or a progressive agenda. The basic idea of understanding society as a patchwork of complex adaptive systems and using the insights that stem from this, is a general one and can be used by anyone in any particular context. In this thesis, however, we are interested in how to achieve sustainable development and breaking through existing unsustainable societal structures. Besides an enormous ambition on a collective societal level, this also implies that we need to take into account ambivalent and normative goals, inherent uncertainties and different goals and perspectives of societal groups. For transition management, this means additional starting points that are based on achieving long-term changes towards shared collective goals. These starting points relate to dealing with long-term goals versus short-term dynamics, with trade-offs between economic, socio-cul-

tural and ecological development, a balance between present and future interests and strategies to deal with uncertainty and surprise. In essence, transition management is dealing intelligently with ongoing transitions so as to direct them towards sustainable futures.

Managing transitions might seem to be a contradiction in terms due to the inherent complexity and uncertainty and the consequent low level of control we can exercise. From a traditional point of view we could indeed establish that direct influence, power and control seem to be less effective in bringing about desired change in a straightforward manner. This can, however, be challenged with complex systems thinking: unexpected side effects or spin-offs are by definition to be expected although the precise substance cannot be determined. Another example is the reality of diversity; the complex systems paradigm holds that different positions within a system lead to a different assessment of the state of the system and thus to different policies (problems and solutions). Even though a certain level of awareness of such a complexity already seems to exist among some policy-makers, their view is still limited and based on their specific background and professional environment. The same is true for other actor groups in which individuals might be able to reflect upon systemic issues and complexity but are still limited in terms of knowledge, experience and capacity. The transition-concept provides an analytical framework that enables combination and integration of different insights and development of systemic analysis and strategies.

Managing transitions is by definition a highly uncertain and sometimes chaotic process, in which an attempt is made to link different actors and organizations with different time horizons, ambitions and values. For policy-makers, such an approach implies an entirely different way of dealing with policy-making and of organizing the process (Loorbach 2004; Rotmans et al. 2005). From a complex systems perspective, societal dynamics are perceived as chaotic, complex, and impossible to manage in the traditional sense of planning and command and control. Transition management views social change as a result of the interaction between all relevant actors on different societal levels within the context of a changing societal landscape. Managing societal change thus becomes the organization and coordination of this interaction; a way of indirectly influencing, adjusting, redirecting and guiding actions. This is different from the classical forms of management that are based on direct influence, structuring and directing.

The principles for complexity based governance defined in the previous chapter clearly underline the need for systemic approaches, but they do not yet give enough handles to formulate a type of governance specifically targeted at transitions to sustainable development. We need to apply the complexity governance principles to societal transitions and a normative ambition to direct these transitions towards sustainability. Our perspective on sustainable development includes primarily quality criteria regarding the process of development rather than fixed notions or end-states for sustainable development. In our view, sustainability is never a given but always the outcome of negotiation, debate, competition and experiment. Sustainable development becomes much more complex when we try to make it operational, when discussions start to be centered on the actual goals and means. Sustainable development has been represented by the intersection of economic, social and environmental agendas. This however, reflects a fragmented view of reality and in practice different actors have highlighted any of the aspects according to their own interest. "The best solutions are based

not on tradeoffs or *balance* between (social, environmental, economic) objectives but on design integration achieving all of them together – at every level, from technical devices to production systems to companies to economic sectors to entire cities and societies" (Hawken et al. 1999). The central issue for sustainable development is therefore to integrate concerns regarding our societal 'commons' into short term policy-making and governance (Ostrom 1993; Dietz et al. 2003). The metaphor of 'the tragedy of the commons' refers to conflicts between the quality and state of the commons (collective goods and resources) and individuals striving for optimization of their own interest (Hardin 1968). From the perspective of a rapidly expanding population and rapidly increasing consumption, Hardin argues that freedom of choice and consumption will ultimately lead to breakdown of ecosystems and even argues for limitations to population growth. Although such a drastic measure might seem implausibly nowadays, he clearly emphasizes the need for strategies to deal with collective goods and resources in order to preserve these for the future. This requires awareness regarding the necessity of preserving the commons at the individual level as well as strategies to enhance the flexibility, resilience and potential of the commons.

The transition perspective on this claims that in order to achieve more sustainable societal systems, we need to break through our current societal structures which are mainly based on freedom of individuals. Through transitions, new societal systems need to emerge that combine freedom of individual development and innovation with (selection) criteria related to collective goods and future developments. In transitions, developments at the landscape, regime and niche level (Kemp et al. 1998; Geels 2002; Rotmans et al. 2004) interact and reinforce each other, leading to a structural change of the regime. From historical case studies (see also Chapter 7) it becomes clear that such processes can be associated with changes in perceptions, routines, practices and beliefs at the level of individuals. These changes are the result of co-evolution with changes in physical and material parts of the system (technologies, infrastructures, regulations and institutions (e.g. structuration) and with external shocks and changes. Transition management therefore combines a long-term perspective on very complex, diffuse and aggregated systems with a short-term focus on innovation and individual learning.

From this perspective on transitions, we have formulated additional basic elements for transition management besides those formulated in Chapter 3. These are:

- Systems-thinking in terms of more than one domain (multi-domain), different phases (system states) and different scale levels (multi-level);
- Long-term, flexible visions (at least 25 years) as a framework for shaping short term agendas and action;
- A selective multi-actor (participatory) approach to involve relevant societal perspectives and beliefs;
- Back- and forecasting: the setting of short-term and mid term goals based on long-term sustainability visions;
- A focus on learning and the use of a special learning philosophy of learning-by-doing and doing-by-learning;
- An orientation towards transition, system innovation and innovation;
- Creation and active management of societal niches and protected environments (for both actors and innovations).

The basic steering philosophy underlying transition management is that of *anticipation and adaptation*, starting from a macro-vision on sustainability, building upon bottom-up (micro) initiatives, meanwhile influencing the meso-regime. Goals are not fixed but developed (through a search and learning process) by society and the systems designed to fulfill these goals are accordingly created through a bottom up approach using incremental steps directed toward a long-term goal (e.g. directed incrementalism (Kemp 2003)). The anticipatory elements relate to reflection upon future developments, formulation of alternative visions and creating a sense of urgency that short term action is necessary to deal with future challenges. The adaptive elements include a flexible process approach, a focus on (social) learning as basis for action and an experimental approach towards societal innovation. The governance activities designed to further the goals are not set into stone but are constantly assessed and periodically adjusted based on new experiences or developments. Over time, a cyclical and iterative process thus unfolds wherein the long-term orientation or vision will increasingly guide short-term action. Such an approach differs fundamentally from regular policies that are aimed at achieving short-term goals or organization of successful processes, without ever reflecting on the overall benefit of specific policies or the longer-term objectives. The rationale behind this approach differs fundamentally from those behind government-based or market-based approaches. Transition management can therefore be seen to propose a new governance community or arena between government and market that allows for long-term reflection, innovation and social learning and collective goal- and strategy-formulation (see Figure 4.1)

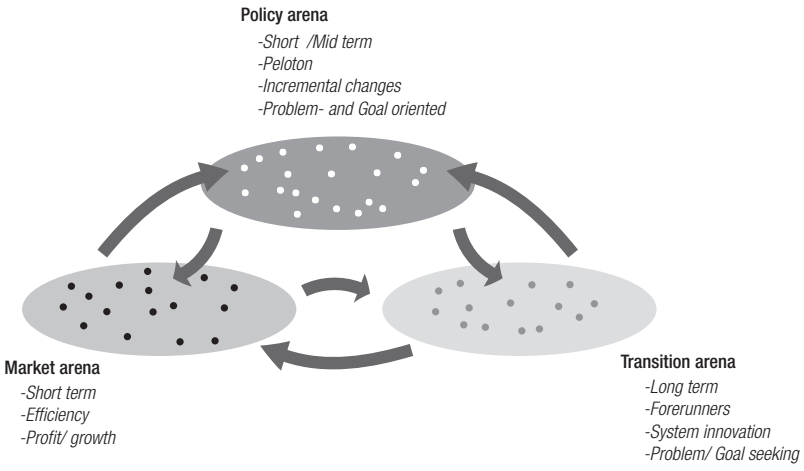
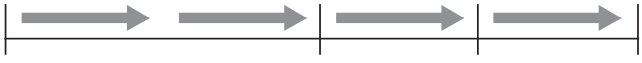


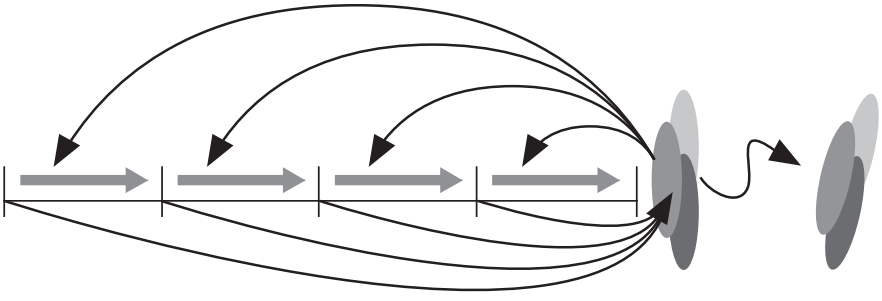
Figure 4.1 Transition arena as alternative circuit enabling sustainable development (Rotmans 2005)

These different 'arenas' (a term also used by Bourdieu to describe social communities or what he called 'field' (Bourdieu 1977)) and their respective habits and practices have their own specific logic, currency and goals. In this sense 'arenas' are not so much recognizable entities but rather specific types of social environ-

ments in which specific actors operate under shared conditions, worldviews and routines. Within the policy arena, formal procedures, development of concrete policy and regulation and enforcement on a relatively short-term are the basic practices. Decisions are made based on representation, negotiation and consensus. In the market arena, short-term economic interest, individual survival and competition are the norm. Decisions are made top-down by managers and the focus is on effectiveness and efficiency. In the transition arena, informal networks, creativity and innovation are the basic ingredients. Decisions are made based on a long-term vision and a shared agenda by the actors themselves, and the process of realization and implementation is partly facilitated by government and market. Although of course these characterizations are stereotypical, it is undoubtedly so that both within the government as well as in the market arena, the focus is on a relatively short-term and not primarily on collective, sustainable futures in general.[3] A schematic view of the difference between the regular policy process within government and business and transition management is given in Figure 4.2.



Regular policy process: *flow oriented and gradual*



Transition management: *oriented towards long-term susatinability goals (plurifocal)*

Figure 4.2 Regular policy versus transition management process

Transition management breaks with the traditional planning-and-implementation policy model aimed at achieving particular outcomes in a set period of time (solution-driven, government-based). It also tries to provide an alternative to a *laissez-faire* market approach in which outcomes are primarily driven by achieving effectiveness and economic growth. This fits within the historical evolution in policy-making since the 1950's from state-centralized to decentralized

3 Although of course government is concerned with societal goals, these are often pre-defined, solutions are given and a time-horizon is set. Sustainable Development and governance for Sustainable Development require long-term goals that are inspiring, shared and societal without being concrete, prescriptive or short-term.

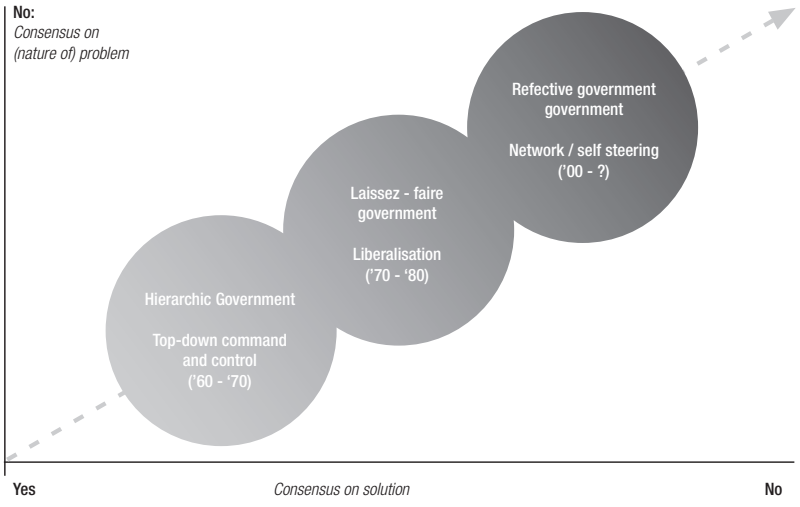


Figure 4.3 Historical development of policy-making paradigms in general (Van de Lindt et al. 2002)

forms of governance. Although historically very strong government policies and steering are more of an exception than a rule (Kickert 2004), there is a general tendency over the last decades of increasingly taking into account societal complexity and its dynamics. Transition management is a new governance concept that combines strengths of top-down and bottom-up approaches without falling into the pitfalls of becoming either too hierarchical and rigid or too free-floating. This can be considered a logical next phase in the evolution of policy-making (see Figure 4.3). With the increasing complexity of our society (in terms of increasing interdependencies, individualization, technological development, internationalization etc.), societal problems have also become increasingly complex to define, let alone to solve them. Although, obviously, at an abstract level policy-making has always relied on participation and markets as well, it seems clear that traditionally government had the authority to centrally develop plans and policies. This enabled a form of government in the 1960s and 1970s that was hierarchical and based on control in terms of knowing (certain knowledge) and action (planned action and outcomes). During the 1980s and 1990s, liberalization and market-forces were increasingly regarded as remedies for an increasingly complex society and the limited influence of government. Some even claimed that liberalization combined with democratization had become the dominant path of societal development and would ultimately become the model for all societies (Fukuyama 1992). The government developed new modes of governance, for example environmental agreements with specific sectors, target group policies, voluntary agreements and so on. Policy and governance sciences in this context became more interested in the exploration of the possibilities of government steering within the limitations of complexity (Kickert 2004 26), but the focus remained largely on expanding government practice. Besides lib-

eralizing markets, government tried to influence the market conditions so that the perceived gains of liberalization (a.o. increased efficiency, low-prices, more variation) would be ensured for society. Arguably, this obstructed the development of truly free-markets which could be part of the explanation why the liberalization approach came under criticism by the end of the 1990s. The 'discovery' of the network-society and experiences with participation in policy-making on the one hand and the increasing awareness regarding persistent societal problems (climate change, energy, biodiversity and so on) led to the notions of a risk-society and sustainable development. It is argued that the complexity of the network-society, problems with effectiveness of formal democratic institutions (North 1990; Ostrom 1993) and the increasing uncertainties regarding future development (Beck 1999) call for new governance approaches to achieve desired societal order. Historically, we see that the types of problems central to policy-making have become more complex and persistent (one could also argue that policy-making has gradually broadened its scope), requiring increasingly complex and reflexive approaches to deal with them. Transition management is explicitly aimed at these persistent problems, while simultaneously providing a framework for selection and use of more regular approaches at lower levels of scale or targeted at sub-problems.

Transition management is based on a process-oriented and goal-seeking philosophy which helps to deal with complexity and uncertainty in an integrated manner. As such, transition management breaks with the famous Dutch consensus based polder-model by opting for consensus on long-term sustainability goals, while at the same time allowing for diversity and informed dissent in the short term. Because of the tensions between regular policy processes and individual short-term interests on the one hand and transition management and collective societal interests on the other, transition management needs to be initiated besides regular policy, more or less as a 'shadow track'. Of course without becoming totally detached from formal and official policy networks and circuits, transition management benefits from protection especially in the more creative and envisioning phases. A transition arena in this respect becomes a protected space or a niche, in which alternative visions, agendas and actions can be developed and emerge. Conceptually, a transition arena then is the 'field' in which actors involved in long-term and sustainable innovation can interact, cooperate, discuss and compete under another logic than dominant in the regular policy or market arena (see Figure 4.1). Indicated by transition theory (Dirven et al. 2002; Loorbach 2002) and supported by experiences from practice (see Chapters 8 and 9), there is a continuous process of drifting apart and coming together of the different arenas in practice (see Figure 4.4). The management of the inter-

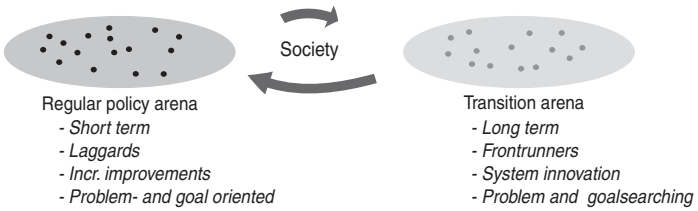


Figure 4.4 The transition arena as a new field of governance

face between a transition management process and regular policies is therefore also part of transition management, to which we will come back in Chapter 6. In that sense the transition arena in fact is a niche for (policy) innovations to mature and from there diffuse and can be used a systemic-instrument to influence (or *transitionize*) ongoing policies.

4.3 Transition management: the paradox

Transition management is built around the governance paradox that 'societal change is too complex to handle in terms of management but it is possible to formulate relatively simple rules how to influence societal change'. The rationale for handling this steering paradox is that insight into societal complexity by taking a complex systems approach can help in fathoming the possibilities for influencing societal complexity. This logically connects substance (content) and process, which are explicitly linked in transition management: the complexity analysis of a societal system under observation determines the opportunities for managing such a system. Using analytical concepts such as multi-stage and multi-level (Rotmans et al. 2000) provides opportunities for identifying patterns and mechanisms of transitional change. Once we have identified transitional patterns and mechanisms we can determine process steps and instruments how to influence these patterns and mechanisms. This approach differs from earlier attempts to use a (complex) systems approach for management of policy issues (for example: Kickert 1991; Kooiman 1993; Stacey 1993; Gell-Man 1994; Arthur 1999). These approaches were either rather technical, deterministic because they based their approach on closed and predictable systems approaches. Or they were too abstract because of an emphasis on the chaotic and unpredictable behaviour of complex systems instead of generic patterns and dynamics. For policy sciences, the emphasis on complexity as unpredictability, chaos and uncertainty leads to adaptive, no-regret approaches. Well-known are incremental and adaptive approaches and governance models that leave no or only limited room for structuring, planning or long-term ambitions and in which progress is made by creating beneficial conditions under which societal actors can cooperatively achieve collective goals bottom-up (Teisman 1992; Lindblom and Woodhouse 1993; Kickert et al. 1997). Strong government planning and collective envisioning are questioned with regard to their effectiveness towards short-term policies, although these authors also do not disregard the possible influence of planning and strategy altogether. The complexity perspective as described in Chapter 3 however suggests that there are generic patterns and dynamics that could allow for intelligent forms of planning based on learning. This perspective thus holds that there is much room for anticipatory and envisioning approaches to become influential in the context of short-term policies, provided that long- and short-term are explicitly linked, the approaches are not deterministic and processes are not based on false expectations.

The relationship between management or governance and complexity theory is a rather delicate one. Rosenhead (Rosenhead 1998) for example questioned the one-to-one applicability of complexity theory (with the emphasis on chaos and unpredictability) for (business) management practice. He critiques Stacey for using complexity theory as much more than a mere metaphor, namely as an anal-

ogy that can provide deterministic rules. Stacey (Stacey 1996) concludes that, because of the chaotic and highly unpredictable complexity patterns, the best strategy for management is an adaptive one whereby the (business) organization is as flexible as possible (*at the edge of chaos*) in order to deal with unforeseen changes. Stacey emphasizes that complex (societal or business) systems behave unpredictable and uncertainties and surprises are inherent to this. For individuals firms or actors this implies that future orientation, strategy development and anticipation will almost always fail. He thus more or less dismisses analysis, problem-structuring and forecasting exercises as useful for policy and management. Rosenhead (Rosenhead 1998) counters this perspective by emphasizing the reflexive potential of group decision, problem structuring and scenario-methods that, although they do not provide conclusive answers, they do provide common ground to act upon. Transition management tries to combine two perspectives on complexity (patterns and chaos) by combining anticipatory and adaptive, bottom-up and top-down approaches to utilize predictability as well as unpredictability of societal systems. Transition management is oriented towards reflexive planning and development and is not based on deterministic, but reflexive rules and a continuous iteration between process and analysis. The rules themselves are adapted to a specific context[4] and in turn need to be adjusted because the conditions and dynamics will change as a result of applying these rules. Key here is the intimate relationship between the substance and analysis of societal systems on the one hand and a governance process tailored to this context on the other. By iterating between substance and process, a reflexive cycle is followed in which anticipation and adaptation are integrated and the governance process can continuously be adapted to changed context factors or new developments. Learning, searching and experimenting are therefore central elements of transition management.

Rather than a completely new concept, transition management builds on and integrates existing approaches and establishes a genuinely new approach. By combining the complex systems perspective, new forms of governance and the normative notion of sustainable development, it is presumably possible to better and more systematically influence, organize and structure societal change processes. This could be achieved by mutually structuring substance and process, and select consciously different steering forms and policy instruments. The transition management approach this way offers a governance framework for structuring governance, which also means that descriptive policy and governance theories, models and instruments could be integrated into an operational transition management model (see Chapter 6). Examples of descriptive governance theories and concepts that so far have not been operationalized in an integrated, prescriptive model are multi-actor policy-making, adaptivity and reflexivity of the policy process, policy and social learning and the effectiveness of long-term planning. These are central aspects of governance processes that are observed, described and analyzed in existing theories, but so far have been poorly developed into operational approaches. Transition management is best described by linking the central elements to existing bodies of knowledge:

---

4 The context in which transition management is applied is important in terms of the state of development of a system, in terms of the actors involved and in terms of the institutional context.

- Multi-actor policy making
- Long-term, collective goal setting and anticipation
- Agenda-building
- Experimenting and innovation
- Evaluation, adaptation and reflexivity
- Knowledge diffusion and learning

These are central elements in the literature on policy making and governance and are also the main elements of transition management. In fact the transition management cycle (see Chapter 5) consists of these elements. They are operationalized in the transition arena model in Chapter 6.

Multi-actor policy making

Transition management is defined as a multi-actor process in which individuals and representatives from government, societal organizations, business, knowledge institutes and intermediary organizations participate. A basic starting point is that all actors influence in some way societal change and that the governance of these activities must therefore necessarily be participatory. In a sense, transition management is a form of meta-governance (Jessop 2002); influencing and managing existing networks and actors. Transition management facilitates a range of processes and points them in the same direction with a combination of network steering and self-steering. Contrary to the mainstream participatory approaches to policy-making that opt for developing broad consensus for policies, transition management can be seen as a selective participatory approach based on a 'narrow' and temporary consensus amongst frontrunners. This consensus is mainly sought in terms of problem definition and long-term ambition, allowing for innovation and competition between ideas, options and agendas on the short-term. So although a consensus is sought on the long term, it drives on the involvement, innovation and creativity of individuals and organizations based on limited consensus.

In policy practice, participation is predominantly used to generate public support. This way, policy-making is still viewed as primarily the responsibility of the government, and participation as a necessary, but often complicating condition for either carrying out governmental policies or dealing with conflicts of interest (Kickert et al. 1997; Klijn and Koppenjan 2000). To use participation to generate public support does indeed have some important advantages. Citizen involvement enhances the legitimacy of policy, helps to reduce the risk of conflict, offers an additional source of knowledge, ideas and information and through their involvement people and organizations learn about problems and solutions. Citizen involvement is not a substitute for government; a clear role of the government is expected and needed, which in practice is very difficult and often ignored. The well-known Dutch polder-model is a clear example of this involvement of stakeholders, defending vested interests and negotiating between (slightly) different goals. This consensual approach emerged as the dominant form of policy-making in the Netherlands during the nineties, when stakeholder participation and interactive government were seen as ways to counter problems with state legitimacy and effectiveness (Visser and Hemerijck 1997). It is argued that the strengths of the polder-model are in essence the capacity to adapt to changing circumstances and formulate consensus based-solutions in

times of crises. From a transition-perspective however, both anticipative and adaptive capacity are needed to achieve sustainability. When assessed in terms of innovative output, the polder-model approach often leads to time-consuming procedures and often mediocre solutions because of the involvement of representatives and the consensual approach (Berkhout 2002 27; Nooteboom 2004). It seems clear that in a modern society the adaptive capacity offered by the polder-model approach is more than necessary, but not sufficient in light of sustainable development. The question thus is how to organize participation and interaction that can result in radical innovation while maintaining effective governance and adaptive capacity.

The solution offered by transition management is threefold. First, by having a participatory approach in which participants are selected based on their specific roles, backgrounds and competences, and their explicit ambition for innovation. This prevents participation based on vested interests and a defense hereof. Second, by starting from and focusing on the long-term process of sustainable development and rely on mutual adaptation against a set of collectively chosen long-term goals (see Chapter 5 and 6 for a more specific argumentation). Third, the point of departure of transition management is to initiate a transition of a societal system by stimulating instability and change through promoting changes in structures, culture and practices simultaneously. Transition management in a sense tries to destabilize a societal system, but only does so by taking small steps. For such an approach a small but firm support is needed that only gradually is broadened. Based on the idea of network-steering or governance (Marin and Mayntz 1991; Kickert et al. 1997; Eising and Kohler-Koch 1999; Milward and Provan 2000), a network of innovators is selected and organized so that the developed visions, agendas and ideas can spread throughout larger networks and in doing so become part of a newly emerging structure, culture and practice. This approach means that a large array of societal groups can (and need to) be engaged in the process; representatives from government, business, knowledge institutes, non governmental organizations and all sorts of intermediary organizations. In the Netherlands, and many western European countries, involving social groups in policy making has become more or less standard practice under labels such as interactive or participatory policy making. The rationale behind these approaches is that policies are developed in interaction with stakeholder groups so that they are more effective and widely accepted when implemented.

When organized properly, transition management stimulates self-coordination and steering among actors without controlling the process in a classical top-down control mode. It does so by creating a context in which actors share long-term goals and a general discourse in which they define shared problems in a similar manner, but without a necessary agreement on specific solutions or action. This 'mechanism' has been described at different levels and within different disciplines. For example (Ostrom 1993) identifies self-governance as an important coordination-mechanism (mainly described within ecological management and development work) which potentially may lead to more effective and more sustainable solutions than top-down strategies. The tentative conclusion is drawn that too much control and top-down planning might even be harmful for the later support and continuation of specific strategies. Self-governance, or self-coordination, can also be understood as an autonomous mechanism of interaction and mutual adjustment between individuals or actor-groups and net-

works. Lindblom (1965, 1997) defined this mechanism as partisan mutual adjustment: in a generally understood environment of moral rules, norms, conventions, and mores, interdependent actors modify their own behaviour just enough to accommodate the differing purposes of others, but not so much that the mutual adjusters lose sight of collective goals. In more general terms: actors negotiate amongst themselves, through debate or through action, best possible solutions for a problem they share. Solutions can by definition not be given beforehand but need to be the outcome of these interactions and thus emerge. In transition management this mechanism is utilized by organizing and facilitating interaction without influencing the substance of the process, since the outcomes are the result of the interaction itself and not of individual choices or demands. By co-developing visions and agendas and collectively carrying out practical projects and experiments, the mutual adjustment of these perspectives and expectations take shape. This paves the way for developing shared long-term goals and strategies to work towards these goals.

Long-term, collective goal setting and anticipation

Transition management does not aim to control the future (to use Wildavsky's term) by engaging in comprehensive planning (based on blueprints). It attempts to subtly influence ongoing processes of societal change by systematically reflecting upon the future and developing shared notions of desired future sustainable states. As Wildavsky defines it: 'Planning is current action to secure future consequences' (Wildavsky 1979 9), in which short term actions are thus a result of anticipating these future consequences. Shared notions and long-term ambitions and goals are by no means set in stone, but rather act as cognitive frames for individual action. The paradox mentioned earlier comes back here: although one acknowledges that the future is inherently uncertain and unpredictable, it is still useful to reflect systematically upon the future so that flexible or robust strategies can be developed. Transition management enhances anticipation of long-term systemic effects through the use of envisioning, scenario- and trend-analyses, back- and forecasting exercises and identification (and selection) of innovations. Insights from innovation studies about self-reinforcement are used for creating paths while at the same time one is careful not to get locked in to sub-optimal solutions, by opting for a flexible, adaptive approach through the development of shared agendas and experiment-portfolio's that stimulate all sorts of technological, institutional and socio-economic innovations. In this way the anticipation and control dilemma of Collingridge (Collingridge 1980) – with control possibilities being largest when you know the least about the problem – is dealt with. It is still possible that side effects become apparent at a later time, when the innovations have diffused, but the chances of this happening are reduced and the possibilities of unforeseen side-effects are explicitly part of the expectations regarding the long-term strategy (Kemp and Loorbach 2003). The cyclical, reflexive process between long-term goals and short-term action functions in this to constantly re-evaluate and adapt the developed goals, strategy and action based on desired, foreseen developments as well as unexpected and undesired effects. Transition management combines elements of push and control with elements of pull and adaptivity, which is one of its advantages.

Ambitions, goals and strategies chosen are continuously re-assessed, together with policies to achieve progress. The participatory nature of transition manage-

ment allows for iterative problem- and goal formulating processes between different types of actors. For example, the interaction between scientific knowledge, practical experience from practitioners and the regulatory context can lead to new insights into problems, complementarities, innovation and uncertainties. Through a systemic evaluation and adaptation of the progress made, the process moves forward. In a sense through its anticipatory nature transition management engages in "context control" so as to orient policy and market dynamics towards societal goals. The context control consists of regulations, economic instruments (the use of taxes, subsidies and emission trading), the use of policy goals and voluntary agreements and specific types of planning (such as land use planning). It consists of government acting to secure circumstances that will maximize the possibilities for progressive social movement by promoting innovation and mitigating negative effects (Meadowcroft 1997). In this sense, context-control may also be regarded as a form of planning (Kemp and Loorbach 2003).

Anticipative strategies in general help to deal with three problems of intelligent change: 1) ignorance: uncertainties about the future and the causal structure of experience, 2) conflict: inconsistencies in preferences and interests, 3) ambiguity: lack of clarity, instability and endogeneity in preferences and interests (March and Olson 1995). Like Lindblom, March and Olsen are negative about the use of expert intelligence, saying that "the history of efforts to act intelligently in democracies is a history of mistakes". They are especially critical about political change based on anticipatory rationality, based on backward reasoning from anticipated consequences[5]:

> "Too many atrocities of stupidity and immorality have been based on anticipatory rationality, and too many efforts to improve human action through importing technologies of decision engineering have been disappointing" (March and Olson 1995 198-199).

They clearly show the limitations of the use of anticipatory outcomes but are too negative with regard to anticipation in general. Anticipation in general seems to be a good basis for action, at least when taking into account uncertainties and maintaining reflexive. In part, this is what transition management tries to make explicit through its use of visions. Although transition visions are primarily meant as guidance for short-term action (Grin and Grunwald 2000), they also help to influence or shape expectations about what might happen (thereby also influencing anticipatory behaviour). Transition visions and goals are therefore by no means expert predictions or 'hard' goals for policy, but much more represent qualitative societal goals and ambitions that evolve through new insights, knowledge and experiences derived from short-term experiments. In transition management experiences thus inform next steps as much as long-term visions and ambitions do. So visions and transition processes are mutually dependent: visions are guiding in transition processes but transitions do also co-shape the visions developed. This is exactly the aim of transition management, to

5 The criticism of anticipatory rationality should probably not be taken as criticism of anticipation or a call for short-sightedness but as a criticism of a particular method for dealing with the future: strategic planning. According to Club of Rome member Mesarovic (2001), sustainability requires anticipatory democracy.

pressurize the current regime subtly, by developing alternative visions and an alternative agenda within protected environments, transition arenas (Meadowcroft 2005).

Agenda-building

A key element in transition management is the development of a shared transition agenda. This agenda can be defined as: 'a societal strategy to work towards shared visions, including a number of sub-strategies and concrete experiments'. A transition agenda necessarily includes different strategies and the means from different actor-groups to realize their objectives, the so-called transition paths. In the context of transition management, agenda-building is seen as a means to achieve coherent network- and coalition-building and create shared notions of goals and ambitions. Therefore the process of agenda-building is seen as more important than the actual agenda, because in this process the barriers, necessary conditions and levers for change are identified and subsequently ways are mapped out to deal with these problems.

Agenda-building as a concept in the literature has been mainly applied in the context of policy-making (Baumgartner and Jones 1993; Kingdon 1995; Dirven and Kusiak 1999). Usually, the policy-process is conceived as a linear process that can be divided into different phases or stages (in fact, there are numerous stage-models that differ only in their definition and description of the stages) from problem recognition to implementation of the solution. Agenda-building is seen as one of the first stages (Sabatier and Jenkins-Smith 1999 2). For example Kingdon illustrates that government and politics become concerned with specific issues only through a process of what we can call social construction combined with external conditions. On the one hand, what is defined as a problem is directly linked to individuals, perceptions and action: people perceive a problem, define it, generate proposals and discuss them with other actors. On the other hand, there are the conditions: societal changes, crises or other developments that draw public attention and force politics to take up the issue. Political agenda-setting is thus perceived as a process of construction, negotiation and debate which results in an evolving agenda where new issues can be taken up and existing issues can fade away (Kingdon 1995 198). Transition management tries to structure a similar process, but then in a societal context and at the level of a societal system.

Two main issues are crucial to the agenda-setting process: problem recognition and structuring, and the balance between individual and collective agendas. Transition management tries to incorporate both elements in the agenda-building phase. The object of agenda-building is to gain societal support and attention for an issue by first of all defining it as an issue and secondly by formulating alternative solutions. By doing so in a participatory setting and based on shared visions and ambitions, strategies are co-constructed on a collective level (not based on individual interests alone) and problems are framed in terms of barriers against realizing the desired change. Examples of such barriers are specific regime-conditions that hinder implementation of specific innovations. Thus collective change-trajectories and strategies on a sub-system level (transition paths) can function to structure problem and solution strategies within a network; they can simultaneously function as a communication tool toward external actors such as politics (and so in a sense form a more structured approach to draw attention from politicians).

Experimenting and innovation

Important research on innovations stem from the fields of economics and technology studies. Schumpeter (Schumpeter 1934) was one of the first economists to conceptualize the innovation process as a driver of economic development. In his work, Schumpeter distinguished between different types of economic innovation, directly related to actors (entrepreneurs): new products, new production methods, new sources of supply, exploration of new markets and new ways to organize business. He argued that the only way for economic development was through a dynamic competition between optimisation and innovation. He referred to this destabilising force of innovation as 'creative destruction', in fact the inevitable alternative to stagnation and stand-still. Schumpeter argued that the dynamic (in-)balance between optimisation and innovation showed a cyclical pattern. In this he followed Kondratieff (Kondratieff 1935), in searching for recurring patterns in the economy. Although questions have been raised concerning the predictive capability of the cyclical model (Kondratieff suggested cycles of 54 years), the main message remains that possibilities for innovation are contextual and change over time. This insight is addressed in transition management through its continuous reflection on the societal environment and its aims to develop a context in which desired innovations can mature and diffuse.

The innovation process itself has also become subject of research in economics, business and management studies. For example Utterback (Utterback 1994) has developed a long-term and multi-phase perspective on innovation (mainly in industry). He distinguishes between product and process innovation (based on his work with Abernathy) and differentiates between the processes leading to diffusion of new products and processes. He finds that the main drivers for the innovation process, which follows a general pattern over time, are creativity and competition (Utterback 1994 xviii). This perspective has recently been re-conceptualized in evolutionary terms within the emerging field of evolutionary economics (for example: Arthur et al. 1997; Van den Bergh and Gowdy 2000; Allen 2001). Innovation here is explained as the result of processes of variation and selection, leading to emerging innovations and novel structures (markets). Although early economists (like Schumpeter) already incorporated evolutionary thoughts in their theory, only recently notions such as diversity, selection environment, co-evolution and emergence have been used explicitly to build a dynamic (punctuated equilibrium) paradigm on economic and institutional change (for example, see: North 1990; Arthur et al. 1997; Van den Bergh and Gowdy 2000; Van den Bergh et al. 2005). Since transition management is also based on a co-evolutionary perspective, evolutionary economics provides powerful insights for dealing with economic innovation processes. However, evolutionary economics suffer from a preoccupation with economic indicators and a focus on markets and micro-level innovation. Transition management focuses on societal innovation which is not only driven by economic criteria and logic and also involves large-scale institutional and cultural innovation preceding product- and process innovation. In addition, transition management tries to influence the variation and selection process effectively (by simultaneously influencing the diversity of options as well as the selection environment), while evolutionary economics so far mainly provides a new analytical framework.

A second form of innovation studied in the literature is (socio-) technological innovation. Although this is closely related to economic innovation and evolu-

tionary economics, the focus here is on the technology development trajectory and the following diffusion of the technology (where it overlaps with economic innovation). Within socio-technical studies, innovation is defined as a process of niche-development (Kemp et al. 1998; Rip and Kemp 1998; Geels 2002). The term 'technological transition' (Kemp 1994) is used to define the structural transformation of a specific technological regime (for example from sailing ships to steam ships, from horse-and-carriage to automobiles (Geels 2002)) as a result of innovations that emerge in niches and through a process of competition (variation and selection). The broader focus on socio-technical innovations leads to the notion of lock-in: the selection of specific options leads to the development of specific infrastructures, investments and use (in a co-evolutionary way), thereby creating an increasingly benevolent environment for that specific innovation and ruling out alternative innovations. A lock-in can be a barrier for further change or transition but it is also the mechanism underlying successful diffusion, since a lock-in creates certainties amongst investors, generates all sorts of related activities and thus becomes a self-reinforcing process.

Transition management aims for societal innovation (Rotmans 2005) in the broadest sense, which can be seen to include all sorts of innovation processes described in the literature. Transition management is therefore by definition concerned with both the different types of innovation processes as with how these interact and co-evolve. In general, societal innovation is defined as changes in actors, structures and culture, but can in fact include technological, institutional, regulatory, behavioural, spatial, economic and cultural innovations. Through a combination and integration of innovations embedded in a broader and longer-term strategy, transition management tries to 'deepen, broaden and scale-up' (Van den Bosch and Taanman 2006; Rotmans and Loorbach 2007) ongoing innovations into system-innovations and ultimately transitions. The instrument used here are transition-experiments in which ongoing innovations are '*transitionized*' in order to increase their potential contribution to innovations at higher levels of scale. Such an innovation journey can be regarded as a cascade of innovations, see Figure 4.5.

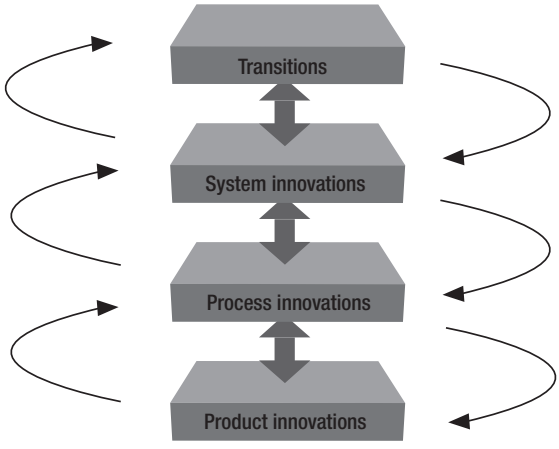


Figure 4.5 Cascade of innovations (Rotmans 2005)

Evaluation, adaptation and reflexivity

The steering philosophy behind transition management is the modulation of ongoing societal developments and innovations at different levels against a set of collective chosen goals.[6] The role of the government as part of societal networks is that of facilitator and mediator as well as director and decision-maker, depending on the different stages of the transition. The structuring form is centralised, cooperative context-steering oriented to producing controlled structural change (Jessop 1997 109 calls this heterarchy) in which there is a co-evolution between modification of structures and modification of the self-understanding of actors (identities). In this process of problem structuring, envisioning, strategy development and implementation and experiments, actors and structures co-evolve. This requires strategic capacities and interests of individuals and collective actors and a reflexive development of collective strategies and tactics. Re-institutionalisation and reframing is an important aim of transition management for which it relies on stimulating reflexivity and creating the conditions for social learning.

Transition management suggests that change at a systems level should be brought about through changes in actors' perceptions and actions (social learning) as a result of systematic reflection on present and future and through interaction and cooperation with other actors. Raising reflexivity in actors implies that they will be better able to cope with uncertainties, emergent developments and surprises because of strategic interaction with and reflection on other actors. Transition management is a form of reflexive governance (Grin and Weterings 2005; Voss and Kemp 2005; Kemp and Loorbach 2006). It aims to deal with real and perceived problems of forms of modernization and tries to avoid or at least proactively deal with risks and negative side effects of solutions. Transition management does so through anticipation (see one of the previous sections), evaluation and adaptation, in a cyclical process. All three elements relate to both the transition management process as well as the transition itself. Transition management:

- **Anticipates** future transition dynamics and develops flexible, forward-looking strategies
- **Evaluates** systematically progress of the transition and transition management (related to one another)
- **Adapts** to changes in the environment (transition) and changes in the process (transition management)

---

6 The term modulation was introduced in the literature on innovation and regime changes by Arie Rip in Rip, A. and R. Kemp (1998). Technological Change. Human Choice and Climate Change. S. Rayner and E. Malone. Columbus, Ohio, Battelle Press. **Volume 2**: 327-399.

It is applied to steering issues of sustainable development in:

– Rotmans, J., R. Kemp, M. Van Asselt, F. Geels, G. Verbong and K. Molendijk (2000). *Transities & transitiemanagement: De Casus van een emissiearme energievoorziening.* Maastricht, ICIS / MERIT.

– Kemp, R. and D. Loorbach (2003). *Governance for sustainability through transition management.* IHDP-conference, Montreal.

– Voss, J. and R. Kemp (2005). *Reflexive Governance for Sustainable Development. Incorporating Feedback in Social Problem-Solving.* ESEE conference, Lisbon.

Transition management can be viewed as an extended form of concepts such as 'reflexive design' (Grin et al. 2004) and constructive technology assessment (CTA) (Schot and Rip 1997). The rationale behind these approaches is that, in situations of inherent uncertainties and normative dissent between stakeholders, it is only through a process of deliberation and design-based approaches that both problem and solution can be co-constructed in an iterative process. Through a process of continuous reflection on a specific innovation or (policy) option in relation to the problem it is targeted at, the development of that innovation becomes more tailored to the problem (in a sense, co-evolves). The searching-and-learning process thus becomes the driver for what has been labeled reflexive development, or on a societal scale: reflexive modernization (Beck 1994). This theoretical concept refers to western societies that try to come to terms with the adverse side-effects of modernization (ecologically, socially and economically). Instead of a unique focus on progress and growth, these societies are increasingly conscious of potential drawbacks and their policies become increasingly reflexive by involving expectations on future developments, perceived uncertainties and possible risks in the decision-making process. In transition management the reflexivity is inbuilt in terms of the anticipation upon possible future consequences, the periodical re-assessment of goals and progress and the evaluation of the governance process and means. Reflexivity is thus a characteristic of the governance process itself, reflection upon past, present and future is an activity (or means) to increase this reflexivity.

Such a reflexive process is partly based on anticipation and robust strategies and partly on adaptive capabilities and flexibility. In essence this is the core of what transition management aims for: a reflexive societal process of experimenting, learning and adaptation (Kemp and Loorbach 2006). Transition management therefore also relates to the field of 'adaptive (eco-system) management or governance' (Holling 1978; Walters 1986; March and Olson 1995; Walker 2004), an approach that emerged in the field of ecological management. The essence of 'adaptive governance' is to develop strategies that are based on the analyses of various types of uncertainty, both structural and non-structural. A strategy is developed which in the short term hardly pays any attention to structural uncertainty, while attempting to reduce structural uncertainty in the long term. This results in a cyclical plan – a combination of short-term steps designed to tackle uncertainty that can be 'managed' and long-term steps designed to tackle structural uncertainty. This approach is to a large extent based on the adaptive capacity and dynamics of ecological systems and can, when implemented, easily lead to 'no regret' strategies, i.e. strategies that will do little damage, irrespective of future scenarios – a kind of low-risk strategy.

Ideally, policy should adapt to changing circumstances and correct policy failures, much like adaptive management of ecosystems. The idea of adaptive management has a long history of being used in terms of management of ecology-economy interactions and even socio-economic systems; it has been proposed by Lee (Lee 1993) as a way of dealing with uncertainty about economic use of eco-systems. A good discussion of the adaptive approach in the context of policy or governance is offered in the book *Democratic governance* by March and Olsen (March and Olson 1995). They note that political institutions must cope with three problems of intelligent change: ignorance, conflict and ambiguity. These factors necessitate adaptive capacity and almost rule out any form of planning

or control. In their view, the road to progress does not lie in long-term planning, using clear objectives, forward-looking estimations, information and calculation, and other elements of strategic planning, but is to be found in contemplating the past, in adapting to changes, in developing capabilities to respond. This requires the creation of mechanisms capable of organizing experience in the service of improved learning (March and Olson 1995 199).

In the literature, adaptive management or governance (mainly used in the context of ecosystem management) emphasizes small incremental adaptations based on external changes and short-term possibilities. This approach is very similar to the rationale behind Charles Lindblom's incrementalism (Lindblom 1959; Lindblom 1979; Lindblom and Woodhouse 1993), who argues for small steps in policy-making. A stepwise approach has four advantages: the first is that it is do-able because it is not disruptive from the viewpoint of special interests; the second is that the costs of a certain step being a mistake are kept low; the third is that it allows one to change course (one gets less locked into particular solutions)[7] and the fourth advantage is that useful lessons may be learned informing further steps. Charles Lindblom powerfully states the case for incremental politics:

> "Abstractly considered, incremental politics looks very good. It is intelligently exploratory when linked with sequences of trial and error. It reduces the stakes in each political controversy, thus encouraging losers to bear their losses without disrupting the political system. It helps maintain the vague general consensus on basic values (because no specific policy issue ever centrally poses a challenge to them) that many people believe is necessary for widespread voluntary acceptance of democratic government. Moreover, incrementalism in politics is not in principle slow moving. It is not necessarily, therefore, a tactic of conservatism. A fast-moving sequence of small changes can more speedily accomplish a drastic alteration of the status quo than can an only infrequent major policy change" (Lindblom 1979 520).[8]

This conceptualization of incremental strategies for change is broadened by Quinn. He states that strategic management involves guiding actions and events towards a conscious strategy in a step-by-step process. 'Logical incrementalism' in his view consists of an integration of the simultaneous incremental process of strategy formulation and the implementation (Quinn 1980). The development of long-term visions and ambitions in his view is a short-term activity that directly relates to short-term action (implementation). This however ignored the possibility of the development of fundamentally different visions and ambitions that only over time influence short term action. Transition management is therefore only partly an incrementalist strategy for changing societal systems. The reason for this is that with persistent societal problems there are no absolute solutions,

---

7 Path dependencies can not altogether be prevented, each act will influence future acts in ways that are not entirely clear. Incrementalism, portfolio-management and the stimulation by policy of robust solutions help to circumvent but not altogether prevent the problem of suboptimal solutions. Lindblom (1997) proposes to rely on the "intelligence of interaction" by relying on partisan mutual adjustment.

8 Of course there is a danger of conservatism but forces of conservatism (in the form of special interests, veto powers, and timid/unimaginative thinking) always play out themselves, at any time and place, as noted by Lindblom in a defence to his critics.

there are too many variables; one has to opt for small steps in what is generally perceived "the right direction", trying different solutions. Through this process in an iterative way, the 'right direction' will be redefined, as will the associated goals. Innovations are not born but require adaptation before they constitute a good solution. It is often insufficiently realized that the efficiency of markets rests on the weeding out of suboptimal designs of products and technologies through market competition. Evolutionary change, founded on trial and error, variation and selection, is often the most intelligent approach in the long run while wasteful on the short-term. This view has greatly influenced the vision of transition management.

Transition management is not arguing for blind incrementalism and takes into account criticisms levelled against incrementalism such as of lack of orientation, conservatism, and negative stance against analysis (Weiss and Woodhouse 1992). Analysis plays a role in the choice of incremental steps (*doing-by-learning and learning-by-doing*). Analysis also has an important role to play in the determination of goals, the identification of visions of sustainability for meeting such goals, and the determination of steps (policy steps and technology steps) to learn about the visions and make a contribution to them. This is not so easy. According to Weiss and Woodhouse (Weiss and Woodhouse 1992 260) incrementalism whilst intellectually appealing never was very helpful to practitioners, in failing to set forth a strategy for making fairer, more intelligent, or otherwise better social choices. Transition management is believed to be more helpful in making a number of concrete proposals, one of which is to develop the long-term vision and intermediate goals to inform incremental action. Whether this leads to better decisions is still an open issue, but practice has already shown that at least novel and alternative steps are identified. Transition management is defined by Rotmans as 'perspective incrementalism' (Rotmans 2005). Part of the appeal of transition management to policy-makers is the fact that it offers a perspective on achieving structural progress towards sustainability but in a relatively non-disruptive way. While at the same time it does not propose some form of top-down control or blueprint approach. A structured evaluation of what has been achieved in terms of transition management and its outcomes, leads to adaptation in terms of strategy/process and substance. In a sense, this closed the learning loop underlying transition management and enables a new cycle of anticipating, strategy formulation, experiment and evaluation.

Knowledge diffusion and learning

To develop governance strategies for long-term, uncertain processes, expert-knowledge is certainly needed, but from the transition management perspective insufficient. In the context of sustainable development, various forms of knowledge (expert, tacit, practical and other) are needed, along with structured processes for integrating different knowledge elements and developing new knowledge. Sustainability as such is not a fixed goal that can be worked towards but rather a journey of discovery. In order to explore new solutions and strategies, transition management relies on the involvement of a diverse number of actors in the transition arena. Not only will the different actors bring in different competences, roles and networks, they will each provide a different kind of knowledge. Within the transition arena, in-depth discussions amongst the different participants will lead to confrontation of their different perspectives and to the

development of shared perceptions of the problem[9] besides the development (integration) of new knowledge and the identification of knowledge-gaps.

This way, different knowledge-elements are integrated into a common understanding of the complex problems and processes at hand. These knowledge elements are by definition very diverse (ranging from technical knowledge about regulation, codes, or procedures to 'soft' or 'tacit' knowledge about behaviour, institutions or other practical issues) so that a lot of energy has to be invested in the process in order to develop a general, shared level of understanding amongst the participants. By trying to discover 'sustainability' in the form of new goals and solutions, the lack of relevant knowledge in certain areas will become clear too and new questions will be asked, which in their turn will generate development of new knowledge. This process of (re)combining different knowledge elements is referred to as co-production of knowledge in which scientific knowledge is often only one part (Gibbons et al. 1994).

A further goal of transition management is to diffuse the new knowledge (ideas, goals and solutions, innovations, alliances, competences etc.) into larger networks. Transition management therefore is a network strategy that tries to use the networks of the participants in the transition arena to spread the thoughts developed there. Involvement of actors in transition management processes therefore need to be extensive and confrontational enough to lead to second order learning amongst the participants. In practice, this means that the participants will reflect on their own dispositions, their own practices and their own roles within the larger context. They will supposedly take home such new insights as well as the new ideas on cooperation, solutions etc. By creating within their own organizations new 'arenas' that address more specific elements of the common approach and strategy, they will contribute to realizing a structure of arenas so that knowledge and experiences can be shared and exchanged between these arenas. If actively pursued, such an elaborated structure could be seen as an instrument for knowledge production, knowledge diffusion and knowledge integration (McElroy 2002). This element of horizontal diffusion in networks and how transition management influences this process is further explained in Chapter 6.

In transition management, one needs to learn not only about singular solutions but about system innovation as well, and about ways to influence processes of suctural change. The process of reflecting on problem and solution, of co-constructing strategies and of experimenting with different options and solutions, can be seen as a process of social learning (Social Learning Group 2001; Clark 2002). Through a selection of a specific variety of stakeholders, a structured process and a systems approach, participants are able to reframe issues and develop new particular goals and strategies. Social learning in transition management is aimed at stimulating a shift in perspective among the participants in an arena and later on in a wider societal context. Although such a broad learning perspective has been applied in organizations (Argyris and Schon 1978), the term 'social learning' has so far been predominantly used conceptually and in a

9 The discussions are based on a participative systems-analysis in which the different participants bring in specific knowledge about specific parts of the system so that they together develop an integrated image of the systems at hand and the main causal relations, dynamics within this system.

descriptive and analytical manner explaining behaviour and behavioural change; only in the last few years some recommendations for governance and social learning have been developed (for example: Leeuwis and Pyburn 2002). In the context of transition management, creating a context in which social learning takes place is seen as a governance approach which leads to behavioural changes at the individual and institutional level. Social learning in transition management is thus a means as well as a goal in itself.

4.4 Conclusion: transition management as a third way

Theory and practice of policy-making and governance have evolved over the last decades. From primarily top-down oriented models, attention has shifted towards approaches that include reflexivity, adaptivity and self-organization. In practice, a shift has taken place from centralized state-based via liberalized market-based to diffuse, society-based coordination mechanisms related to an increasing scale at which (policy) problems are defined. Transition management is defined as a governance approach that fits within this development and is explicitly based upon pre-existing theoretical and practical governance models and approaches. It combines elements of long-term planning with incrementalism and relies simultaneously on markets and networks. It is not a simple mix of these approaches but a distinctive governance approach in itself (in the same way network management was distinctively different from markets and hierarchy as a model of economic coordination).

The transition management approach combines key elements of present day policy-making: networks, long-term collective goals, innovation and learning. Because of its integrative nature and a balance between top-down and bottom-up elements, it provides a structure to deal with these elements in a systematic and focused way. Additionally, transition management has a set of distinctive features that through their explicit role in the governance process can be treated prescriptively rather than purely analytically. Although in the literature different elements of policy-making processes are frequently mentioned (problem structuring, envisioning, second-order learning, agenda and coalition building, innovation portfolios and strategic experiments), they are rarely translated into prescriptive models by linking these elements to a normative goal. The link between transition management and sustainable development presumes a problem-structuring process directed towards development of shared perspectives and language, it presumes specific types of visions and it requires specific types of innovations. In this chapter we have descriptively treated transition management, in the next chapter we will formulate the multi-phase and multi-level framework for transition management based on the theoretical governance approach to transition management presented here and in Chapter 3.

Chapter 5

The cyclical, multi-level transition management framework

5.1 Introduction

In the previous chapters we have introduced the theoretical and conceptual basis of transition management. Transition management, however, also aspires to contribute to new governance practice. In order to translate the transition management approach into an operational model, it is necessary to bridge the gap between the theoretical approach to governance and actor practices or policies. This can be achieved by structuring different types of management and governance in time and according to their specific characteristics. The transition management framework presented in this chapter provides this link and enables the iteration between theory and practice of transition management. This framework for transition management distinguishes between different types of governance activities (strategic, tactical and operational) and different phases of transition management. In abstract terms, we conceptualize the three different types of governance at different levels of aggregation (see also Table 5.1), but the use of the term 'level' is merely meant to provide a structure for analysis rather than to suggest any hierarchical relationship. The transition management framework first and foremost provides a heuristic for actually implementing transition management: it helps to decide when to use which instruments, when to involve which actors and how to decide which process steps should be taken next. The framework is the basis for the prescriptive transition arena model presented in Chapter 6. The framework also makes it possible to descriptively analyze transition management activities in the context of historical transitions. An example hereof can be found in Chapter 7, where the framework was used to analyze the transition in Dutch waste management.

5.2 Transition management: who and what is managed?

For systematically influencing transitions in an operational sense, a form of governance is needed in which analysis and action are integrated and structured according to the specific type of activity. Such an integrative governance approach makes it possible to strategically select the most effective process, instruments and participants based on an assessment of the state of the system under governance. The transition management framework distinguishes between different types of activities that relate to the abstraction level of a problem, the time-scale involved and the appropriate system level. These are the strategic, tactical and operational types of governance activities. There is no necessary hierarchical relationship between these different types of activities; they mutually influence each other and exist simultaneously in time. The distinction between the different types of transition management can be made because of the intrinsic differences between the activities and the actors involved. In this section the different governance types are addressed in terms of substance and in terms of process: what are the differences between the distinguished types of governance and how do these differ from existing concepts that include strategic and operational types of governance?

The types of governance activities distinguished in the framework are based on actors and their activities and do not include systemic patterns and dynamics identified in the transition concepts. The basic idea is that there is a co-evolution between an actor-governance system and a complex societal system in which predominantly macro-dynamics are distinguished (trends, structures, networks, culture etc.). In both systems (the complex societal system and the actor-governance system), dynamics are described at three levels for which different terms are used: macro-meso-micro; landscape-regime-niche; system-sub-systems-elements; networks-actors-individuals. What these concepts have in common is that they relate to the idea of societal change as a result of co-evolution between different types of development (at different levels of aggregation), and that at these different levels actors operate with specific interests, competences and skills, who influence their environment in different ways. The major ambition of transition management is to develop effective (adaptive and anticipative) governance systems for transitions through systematically influencing, guiding and structuring governance activities at the different levels over time.

Strategic transition management

At the strategic level we identify processes of vision development, strategic discussions, long-term goal formulation, collective goal and norm setting and long-term anticipation. In essence, all activities and developments that relate in the first place to the 'culture' of a societal system are included: debates on norms and values, identity, ethics, sustainability and functional and relative importance for society. In the context of regular policies, discussions of this nature draw more attention, especially in periods of pre-development and take-off (see also Chapters 6 and 7). These are periods in which uncertainty around future developments is high and opinion leaders and innovative alternatives are able to voice alternatives and influence societal and political debate. However, the way in which future visions are developed, structural reflection on ongoing and future trends and debate on how innovation should contribute to desired changes takes place, is often more implicit than systematically structured. Such forms of governance or action that relate to long-term change are not institutionalized in regular policy making, which generally focuses on the short- and mid-term because of political cycles, individual interests and public pressure. This is one of the major barriers for successful governance for sustainable development: it needs to circumvent regular policy institutions and dynamics to develop and put on the agenda truly innovative long term goals and ambitions, but simultaneously needs those regular policy institutions and processes to translate the goals and ambitions into concrete policy. The ambition of transition management is to integrate (in a sense *institutionalize,* although this is contrary to the nature of transition management) long-term governance activities into the realm of policy making. Not as a regular and formalized activity, but as a fundamentally necessary element of policy making for sustainable development.

From historical examples such as the water transition, the transition from coal to gas and the waste transition, we have learned that specific actors with particular competences and skills can, during certain periods of transition, have a profound impact on the development path, the direction and the speed of a transition. Through developing and promoting alternative visions cleverly, political and societal agendas can be influenced and lead to changes in individual

practices. Historical analysis suggests that such a form of strategic influencing of long-term processes relies on coincidence, informal networks, intellectual capacities and creativity rather than on government-based planning, scientifically informed and institutionalized policies. Long-term goal setting is not the domain of policy, but rather that of opinion leaders, individuals with strategic capabilities and powerful actors from business, policy, science or society and culture. We can think of high level managers, innovative entrepreneurs, policy makers or even individuals or science fiction writers. In transitions such as the water- and waste management transitions, small groups of innovators from within and from outside the regime, sparked debate at the abstract level of a societal system and put the issue as such on the political and societal agenda. This creates room for generation of ideas for future development and a process of slowly evolving visionary long-term objectives into more and more formalized novel structures, practices embedded in a new culture.

An example of how individuals can have a profound impact on the mainstream thinking about long-term development in a period of pre-development (where chances for innovation increase while the regime becomes increasingly pressurized by crises and changing societal demands), is the transition in Dutch water management (Van der Brugge et al. 2005), see Box 5.1 below.

During the 1960s and 1970s Dutch water management had established itself as pioneering, internationally most advanced and highly professional. Prime example of this dominant engineering and technological water management was the 'Deltaworks', a major water defence system in the southwest of the Netherlands. However, in that same period outsiders were anticipating problems related to this type of water management and started to develop alternative visions in niches outside the dominant regime. In 1985, the policy memorandum 'Dealing with Water' (RIZA 1985) made a plea to incorporate ecological elements in water management. It reached a wide audience, partly due to the ecological calamities evoked by the Delta Works. The (eco-) systems approach advocated in this document represented a new perception proposing water as an integral part of an ecosystem in relation with its community, an idea that was advocated by a small number of strategically operating individuals within and outside the water management institutions (Saeijs 1991). In the 1980s re-organization of the Ministry of Mobility and Water (*Verkeer en Waterstaat*) for the purpose of integrating water quantity and water quality policies, many former Delta Dienst biologists were placed on strategic positions. Cross-fertilization between biologists and water engineers 'infected' Rijkswaterstaat with new ideas. This in fact was a strongly destabilizing factor in the regime as were the protests of the environmental movement, which opened up room for innovative individuals.

In 1987, six people from the Dutch Ministry of Agriculture, Nature and Fishery (LNV) and Rijkswaterstaat (the leading Dutch water management institution) won the national Eo Wijers 'Netherlands – Riverland' contest about the future of Dutch water management, with a plan called 'Plan Ooievaar'. From an environmental point of view, the plan contained original and innovative ideas with regard to future water management. It pointed out the perverse effects

of pure technological and engineering driven water management and pleaded for more flexible, adaptive and robust approaches. The contest invited participants to come up with ideas about future water management. 'Ooievaars' vision departed from decoupling agriculture and nature preservation, claiming that agriculture was damaging and not preserving ecosystems. 'Ooievaar' in this sense broke with prevailing beliefs and questioned the (traditional) influence of agricultural demand in water management. In short, 'Ooievaar' planned the removal of agricultural exploitation in the river floodplains and instead recreated the original meandering riverbanks, rich in plants and animals. A number of 'Ooievaar' based experiments were started with success in different regions, e.g. the Duursche Waarden, in Rhenen and the Gelderse Poort (Bosch and Van der Ham 1998). The Minister was quite fond of the plan, informing the media she had an alternative for expensive dikes along the river.

It was not before the end of the 80s that serious and conscious attempts were made to integrate the two policy fields of spatial planning and water management. Meaningful in this respect is the WWF-plan 'Living Rivers' (WWF 1992) (*Levende Rivieren*), based on 'Ooievaar' with stronger focus on the aquatic ecosystem and its flora and fauna. Wanting to restore broken food chains, 'Living Rivers' proposed the introduction of smaller channels in the river floodplains, and by doing this it showed an alternative to planned dike enhancements. Small channels and excavation of clay-layers in the river floodplains would create more room for water and could thus present a safety strategy as an alternative for reinforcing dikes. Prior to that, smaller groups within Rijkswaterstaat had also explored the possibilities of integrating water policy with spatial planning, one of them resulting in the report 'Dealing with the Surrounding Area' (*Omgaan met de Omgeving*) (Rijkswaterstaat 1992).

Currently, the shift toward a new form of water management is institutionalizing in terms of reorganizations, redefining policy goals, adjustment of standards, and changes in water management practice. New policies, new visions and new concepts are being developed at all levels, and many actors are by now involved in strategic (and to some extent tactical) activities. Main barriers now are the implementation and operationalisation of the basic ideas underlying the new water management paradigm, for example how urban water management could contribute to urban sustainability (De Graaf and Van de Ven 2006). It is clear that the ideas presented in 'Plan Ooievaar' had a profound, although not direct, impact on this process. Being developed by individuals with profound knowledge and experience of the sector who were also in a position to look at it from the outside and reflect on long-term development in that sector, it contained integrative solutions at a high level of abstraction that could later become guiding in the water transition. Also, these individuals were working at strategic positions within the sector or neighbouring sectors, so that they could strategically spread their ideas through drafting policy plans, supporting specific projects, and incrementally change institutional conditions to support their vision, for example by hiring new staff and developing new regulation. It was not until years later that there was enough societal and political support, stimulated by large flooding during the nineties, for integrative water management to become part

of official water policy, and it will undoubtedly take even longer to have it established as mainstream practice in water management.

Box 5.1 Strategic transition management in the Dutch 'water management system'[10]

Historical case studies such as this suggest that influence at the strategic level comes from innovative individuals rather than innovative institutions (although most of the time of course the individuals will be working within institutions), and that these individuals have specific competences, skills or knowledge which sets them apart from the majority of individuals and institutions involved in the field. We will get back to the idea of specific competences, skills and abilities later on (see Table 6.2). These individuals are also able to redefine and reframe a complex issue and articulate abstract but coherent and believable solutions and strategies that are fundamentally different from the mainstream. This observation clearly corresponds well with the observation from complexity and innovation science regarding radical innovation being generally triggered in niches outside the regime. Yet they succeed in initiating or stimulating a transition management process because of an involvement or relationship with the regime, or inside knowledge hereof. The process of developing and diffusing alternative visions and strategies takes place in diffuse societal networks in which different strategic individuals interact. Besides different types of knowledge and resources, these individuals fulfil different roles in such networks. Different typologies exist, but relevant roles include: communicator, expert, innovator, networker, marketer etc. Another important conclusion drawn from these observations for policy is that developing an operational approach for organizing strategic transition management would mean to select specific individuals based strictly on such characteristics and capabilities. A process approach for strategic transition management should then involve a structured process of restructuring and envisioning and a strategic management of the diffusion of their ideas.

Tactical transition management

At the tactical transition management level we identify steering activities that are interest driven and relate to the dominant structure or regime of a societal system. This includes actions (negotiations, planning and control, financial support, programming and such) and institutions (such as rules and regulations, organizations and networks, routines and infrastructures) that are often driven by an interest in maintaining the existing regime or system. The context in which actors at this level operate is in terms of societal systems or sub-systems of a societal system, which is why we define innovations at this level as 'system innovations'. These sub-systems could be for instance sectors or themes, and are by no means always rigidly defined or prescribed, but they are flexible and their demarcation and importance change over time. For example, sub-systems or themes observed within the energy system could be the different sources of

10 This example is based on Van der Brugge, R., J. Rotmans and D. Loorbach (2005). "The transition in Dutch water management." *Regional Environmental Change* **Volume 5**(1).

energy (coal, gas, oil, sustainable), or could be different 'domains' such as technology, policy, market and consumption. Actors operating at this level focus their activities on achieving goals within their specific context but are almost never concerned with the overall development of the societal system. They generally have a time-horizon of 5-15 years which is 'strategic' to them. A company or organization will probably have a 5 year plan or a strategic vision, and understandably so; but from the perspective of transition management, this leads to fragmentation of policies and mediocre, consensus based outcomes at the systems level. For the government (obviously the actor that could be expected to be responsible for development and change at the level of the society) the institutional fragmentation in terms of different ministries, departments, executive offices and directorates is a major barrier for integrative long-term policies. The same might be true for other actors such as business, science and NGOs that are operating in networks negotiating change or projects and running their day-to-day operations. Sometimes these actors are not able or willing to contribute to system innovation but often they are unaware of the possibility. Not because they are not functioning at their own level but because an integrative strategic governance level is missing, there are only very limited instances of successful integrated long term governance.

Political science is often concerned with this level of steering, because it is the level at which political agendas are developed, interest- and lobby groups are active and the policy-making process takes place. Concepts such as the Advocacy Coalition Framework (ACF) and Kingdon's policy streams model, although in theory also applicable to the level of societal systems, are theoretically as well as practically applied at the level of sub-systems. In part this is because what we define as strategic transition management or governance at the systems level, is so far undefined as governance process, in part because the policy process as subject of study can be considered as a system in itself. But although they are often referred to as a (policy) system or coherent process, in practice policies themselves are often fragmented or specialized. Following Heclo, Kingdon, Sabatier and Salisbury, Jenkins-Smith for example defines the policy process as: 'operative within partially segmented 'policy sub-systems made up of those institutions and actors that are directly involved in the policy making process in a specialized policy area' (Sabatier and Jenkins-Smith 1999: p.150). The forms of governance identified as tactical transition management are both implicit and explicit forms of steering. On the one hand institutions, formal democratic, political and judicial procedures and top-down planning and management are perceived as producing structures and incremental change thereof. On the other hand, advocacy coalitions, informal networks, processes of agenda building, and alternative ideas are informally and indirectly influencing the formal process.

Tactical transition management is primarily focused on structuring and directing both formal and informal steering activities and actors promoting change in institutions. Indirectly the formal process is influenced because actors translate alternative strategic visions to the level of institutions and their own agenda. This in turn can set in motion a change in institutions and structures that facilitates new practices and actions. Institutional changes can often be a removal of existing barriers such as regulations, financial instruments and subsidies or organizations, or a build-up of new regulations, institutions and routines. It can also be the introduction of a new practice, construction of a new infrastructure,

development of new knowledge or a new programme for change. In transition terms, at the tactical transition management level a bridge is made between long-term overall visions and short-term action at the level of the regime(s). When a new societal vision emerges, different groups both from the regime and outsiders will interact over how the alternative visions could and should materialize at the more concrete level of institutions, and accordingly what this means for the existing structures and institutions. Transition management influences and structures these processes using the instrument of the transition agenda in which transition images and paths are combined to provide a framework for concrete action of the actors involved. This is explained in Chapter 6.

From political science and management literature, we learn that change at the tactical level is driven by actors with specific competences and institutional affiliation. They are often programme manager, strategic policy official, business manager, senior researcher or entrepreneur. By Kingdon (Kingdon 1995) these actors are referred to as 'policy entrepreneurs', but in the context of transition management they could be called 'governance entrepreneur'. These governance entrepreneurs often have alternative solutions for general problems in their specific area and they have a specific interest in further developing that solution. They can for example arrange funding for new projects, create room for new initiative through their support, develop innovative coalitions, identify new possibilities for business or involve their colleagues in the process. This can only be done based on substantial and specific knowledge about the field, but also based on thorough understanding of and experience with 'tactical' processes of coalition building, agenda-setting and lobbying. Often, these actors are working within regime-institutions (ministries, larger business, universities, large NGOs), and as such fulfil a key role in lifting barriers and creating opportunities for the transition. They have the capabilities to present their ideas in such a way that they become gradually adopted by other actors and are taken up in regular policies. In practice such actors often already have a good professional reputation and track record, and are able to create their own space and time and gain the support of the management of their organization. Of course, such individuals can be found in any organization, not just policy institutions.

Operational transition management

Operational transition management includes all short term actions and experiments of individuals and organizations that have an innovative potential. At this level the focus is primarily on practices: how to influence and alter institutionalized practices and how to develop new ones? It is at this level that actors explore new types of solutions and create innovations (new technologies, new rules, new organizations, new services and so on) that sometimes fail, are sometimes taken up by a regime and sometimes help to transform a regime. In terms of political science, this is where policies are implemented with all its specific problems and characteristics (Pressman and Wildavsky 1973; Grin and Van de Graaf 1996). Transition management in a sense at this level focuses on implementation of governance, including explicit consequences of policy (implementation) and autonomous action undertaken by societal actors to achieve an individual goal (action). Operational transition management tries to align and connect those innovative activities and practices in such a way that they not only shed light on the possibilities for the desired changes in culture and structure, but also provide

a breeding ground for new practices to develop into shared routines and scale up into institutionalized routines and regime-structures.

At this level 'innovations' are often carried out in the context of innovation projects in business and industry, politics or civil society. In the context of transition management it is important to emphasize the inclusive definition of innovation as including all societal, technological, institutional and behavioural activities. Action at this level is often driven by individual ambitions, entrepreneurial skills or promising innovations. In innovation and socio-technical literature, the process of innovation is often presented as an emergent, often random and uncertain, process. In practice, these innovations often seem to emerge in niches (Kemp et al. 1998) without any link to broader policies or agendas and can under specific conditions develop into mainstream options. From this perspective, innovations almost never lead to system innovations and transitions except by chance.

In management literature, a lot of emphasis is placed on how to organize innovation processes and their context in such a way that not only the innovation is developed to its fullest potential, but also simultaneously a beneficial environment (i.e. market) emerges (Utterback 1994; Weber 1997; Kemp and Rotmans 2005). Various approaches have been developed to guide these innovation processes, especially regarding technological innovation in a socio-technical context (Strategic niche management, Constructive technology assessment). Much less attention has been directed towards development of innovative practices, creation and altering of regulations and institutions facilitating change and development of new services. Recently, more attention has been directed towards the interaction between different levels of scale and the up-scaling of innovations (Geels 2004; Geels and Schot 2005; Van den Bosch and Taanman 2006) in terms of different pathways along which niches can converge, cluster and develop into new structures (in fact, mini-systems with their own culture, structure and practices). Although it is argued that governance at this level in the context of transition management should also have an integrated character (Kemp and Van den Bosch 2006; Van den Bosch and Taanman 2006), the focus is still primarily on technological innovation and its context, both in the literature (Jacobsson and Johnson 2000; Geels 2002; Raven 2004) and in policy-practice (Vollenbroek et al. 1999; Taskforce-EnergyTransition 2006).

Perhaps because social learning and behavioural change is more the area of psychology, behavioural sciences and sociology, this area of innovation and how such changes at the level of individuals, their worldviews and practices come about, has attracted little attention in policy and management science although some authors have addressed the relationship between (policy) implementation and learning (for example: McLaughlin 1987; for example: Grin and Van de Graaf 1996). Without striving to understand the innovation journey fully at the level of individuals, it is the objective of operational transition management to create contexts in which co-evolution between innovations of different sorts with individual practices takes place. Policy sciences at this level are often primarily concerned with implementation of policies. Although implementation of policies is often the most complex phase of policy-making (Teisman 1992), it is clear that every-day reality is much more comprehensive than only those areas in which policies are implemented explicitly. Especially in the context of a network-society and a complex governance perspective, self-organization and self-governance by actors in society is an important societal dynamic that needs to be dealt with

other than solely through formalized decision making processes and within the realm of policy. Policy in this perspective should also be concerned with creating circumstances that stimulate creativity, diversity, competition, initiative and innovation. Successful innovations and new practices can evolve spontaneously (or at least unplanned through policies) from micro-level into structures and routines at the meso-level when they are adopted by others. Because of the iteration between strategic, tactical and operational levels of transition management, the operational level is not only focused on up-scaling of innovations, but also on the down-scaling of the developed new visions and agendas at the strategic and tactical levels. Learning goals related to overcoming regime barriers, the plausibility of specific options and the possibilities for change in general are thus explicitly part of activities at this level. Operational transition management is thus by definition experimental and the primary goal is acquiring knowledge and learning at two levels: is this an innovation with potential in itself and does this innovation contribute to an overall transition?

The multi-level framework

We have defined as strategic transition management, governance for sustainable development at the collective and abstract level, i.e. activities that influence long-term societal development. These types of activities deal with the future of the system as a whole and its underlying culture, structure and practices in the context of a changing world and external pressures. Probably this will take into account a time frame of around 30 years, on which a fundamental change can actually take place at the level of a societal sub-system. This relates to questions such as: what is a sustainable energy-supply system? Is there a need to transform our mobility system structurally? Is there a future role for agricultural production in this country? Domain- or sector-specific and interest driven governance activities (agenda-setting, lobbying, coalition-building etc.) aimed at system innovation and transition, we define as tactical transition management. Questions relevant at this level are: how do we realize a sustainable biomass-chain? Which actors need to be involved in promoting and developing new intelligent transport options? How can we transform the existing energy-inefficient greenhouses into energy-producing greenhouses? Governance at this level usually takes into account the existing structures and interests and focuses on changes with a time horizon of around 15 years. Short-term innovative action we define as operational transition management. At this level, in principle all concrete actions and innovations that fit within the sustainability vision are included, ranging from new technologies, new concepts and ideas, to new regulations, (consumer-) behaviour, financial constructions and institutions. To sum up, the levels of the transition management framework are based on differences in the scale on which the problem is observed, the differences in time-frame taken into account and also the level of the system that is dealt with (see Table 5.1).

	Problem level	**Time-scale**	**System level**
Strategic	Abstract/societal system	Long-term (30 y)	System
Tactical	Institutions/regime	Mid-term (5-15y)	Sub-system
Operational	Concrete/project	Short-term (0-5y)	Niche/'mini'-system

Table 5.1 Transition management activity types

The three levels transition management distinguishes coincide and are hard to separate clearly in practice. Strategic, tactical and operational activities are co-evolving, actors operating at different levels constantly meet and interact, and the different activities influence each other. Taking a broad multi-level perspective on governance, we could say that all actors operate at one of the levels in many different directions. More often than not, actions are directed in different, sometimes opposing, directions and the different levels do not reinforce each other. Only when multiple actors at each level direct their action towards shared overall goals, can they reinforce each other and influence transition processes. Transition management tries to align these processes through a combination of network-governance and process management leading to modulation of ongoing activities. By focusing on those actors involved in Sustainable Development and innovation, the modulation is directed there.

The transition management framework can be used to analyze and structure governance processes and activities. This is the basis for any strategy that aims for integration and influencing of governance activities that deliberately aim to contribute to a transition. Because transition management aspires to contribute to long-term innovation, a distinction is made between 'regular policies' and 'transition policies'. What we call 'regular policies' are activities that are not primarily focused on long-term and structural innovation and take place within established institutions. This distinction is especially relevant regarding the tactical and operational levels of transition management; at these levels regular and transition policies interact, compete and co-evolve. What is considered here as strategic transition management level is almost absent in institutionalized form in regular policy; long-term concerns and ambitions are perhaps voiced within political debates or internal discussions, but are almost never guiding for short-term action or decisions. By incorporating this level of governance into the realm of policy, transition management aims to create room for long-term, innovation driven governance.

As said before, the governance activities taken into account can be structured through the framework and are not developed or invented by it. The purpose of the framework is to provide a basis for more systematic governance to achieve improved interaction, integration and co-evolution between activities so that they will impact the present system and regular policies more rapidly, more efficiently and in a more directed way. The goal is to develop multi-level governance systems that are partly based on structuration, selection, shared general discourse and visions, while simultaneously creating room for self-organization, emergence, diversity, competition and strategic individual action. While in initial phases of the transition the system as a whole will be subject of discussion and study, in later phases the process of fundamental change will become increasingly concrete, thereby shifting the focus of governance to lower system levels.

The three levels themselves are also recursive or in other words composed of the same basic elements it distinguishes (famous example is the *Droste effect*; a picture on a cacao-package of a servant holding a plate on which a cacao-package with a picture of a servant with… and so on). Activities at the different levels can also be structured according to the three levels; and operational project will have a strategic ambition (to be realized within 5 years), an agenda and a day-to-day operation. Similarly, within a sub-system or theme at the tactical level, an ambition and agenda (the transition paths) are necessary for achieving institutional innovations in practice. This recursiveness has a certain elegancy

because it allows for all sorts of interactions between and within the levels. In transition management practice, these interactions and their effects are unpredictable and not directly managed, but because they fit within the same overall direction and emerge within a network of actors, they can contribute largely to collective goals. In a sense this type of self-organization is thus indirectly managed: the conditions are created in terms of structured process and substance under which self-organization arises. The governance-system that subsequently develops is a network operating at different levels in which actors sometimes even unconsciously contribute to shared goals. This recursive governance system is visualized in Figure 5.1.

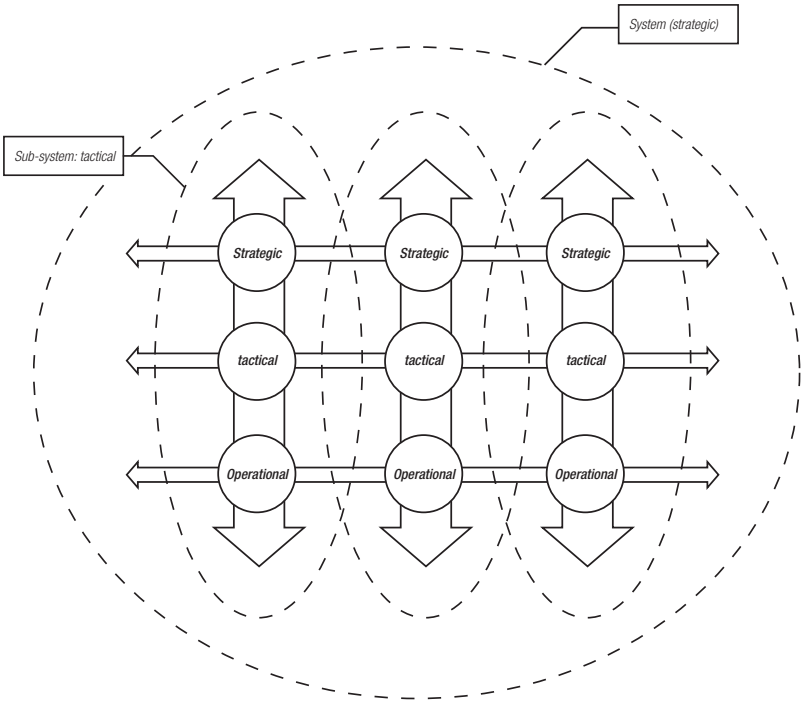


Figure 5.1 (Recursive) governance system

5.3 The transition management cycle[11]

In the previous section, the different types of (autonomous) steering activities of societal actors that transition management tries to influence are structured according to different conceptual levels. In order to develop a coherent and op-

11 In Chapter 6 we present the process methodology for the transition arena in extenso, in this chapter we outline the rationale behind the transition management cycle and its relationship to the transition management approach.

erational process approach for developing the envisaged transition governance system, transition management actively tries to influence the processes at the different levels by using specific process- and analytical-tools. These instruments we call systemic instruments and they are based on the theoretical assumptions behind the dynamics of each governance level and the insights from complexity and transition theory. The systemic instruments used within the framework of transition management are presented in Table 5.2 (Loorbach and Rotmans 2006; Rotmans and Loorbach 2007). The transition management instruments are partly based on theory as described in Chapters 3 and 4 and partly based on practical experience, as described in Chapters 7, 8 and 9.

Systemic Instruments for TM	**Management Principles TM**	**Complexity mechanisms**
Transition arena and transition pathways	Creating space for niches (arenas, new coalitions)	Emergence
Transition experiments	Keeping options open	Variation
Transition agenda / goals	Learning-by-doing and Doing-by-learning	Selection
Deepening, broadening and scaling up	Focus on forerunners	Innovation from nuclei
Complex systems analysis	Multi-level approach Multi-domain approach	Co-evolution
Monitoring and Evaluation	Reflexive governance	Feedback
Transition coalition & networks	Multi-actor approach	Self-organization
Sustainability visions / images	Multi-temporal approach	Attractors

Table 5.2 Systemic instruments for transition management and their origin

Transition management draws together a selective number of forerunners (creative minds, strategists and visionaries) in a transition arena in the pre-development phase of transitions for the development of a sustainability vision and thoroughly analysing the persistent problem(s), making use of complex systems analysis. For the following practical development of the transition vision and transition pathways in arenas of arenas (scaling up through network forming and coalitions), entrepreneurial and innovative actors at the tactical level are involved; project leaders, programme managers, heads of departments and entrepreneurs, developing a transition agenda with long-term goals. The same applies to the operational level; the main parties involved here are inventors, go-getters, practical innovators and practical organizations. By conducting transition experiments, new forms of cooperation, coalitions, networks and arrangements can be developed and stimulated. The priority here is that parties who hardly ever meet will look for new solutions and learn from each other, which needs to be monitored and evaluated. During the transition process the vision as well as the programme of measures will become more and more specific, whereby the focus of attention will (have to) shift to 'regime' actors who represent certain interests within the existing situation. Initially participants will be sought from this group of regime actors geared to innovation, later in the process more con-

servative regime actors will have to be brought on board. This is also monitored and evaluated. An extended operational model for transition management (the transition arena model) is presented in Chapter 6. Here, we focus on the different phases and the core activities of transition management.

The systemic instruments are captured in a cyclical process model as a basis for operational management of multi-level governance. This so-called transition management cycle consists of the following components (Loorbach 2002; Rotmans 2003; Loorbach and Rotmans 2006): (i) problem structuring, establishment of the transition arena and envisioning; (ii) developing coalitions and transition agenda's (transition images and related transition paths); (iii) establishing and carrying out transition experiments and mobilizing the resulting transition networks; (iv) monitoring, evaluating and learning lessons from the transition experiments and, based on these, adjust the vision, agenda and coalitions. In reality there is no fixed sequence of the steps in transition management as Figure 5.3 suggests and the steps can differ in weight per cycle. In practice the transition management activities are carried out partially and completely in sequence, in parallel and in a random sequence.

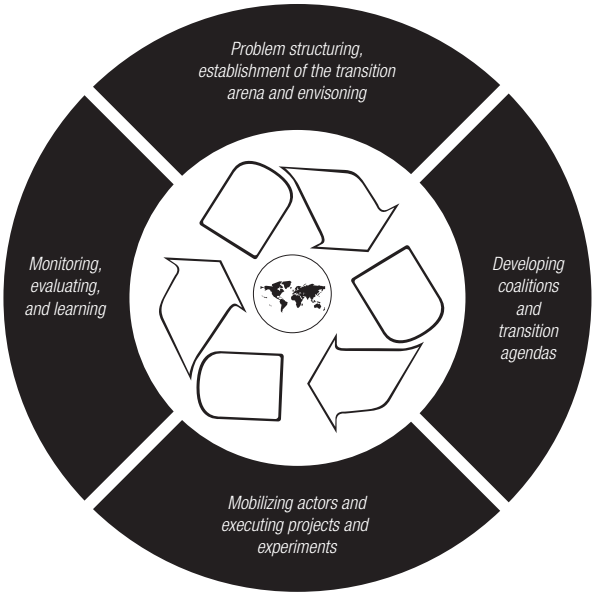


Figure 5.3 The transition management cycle

In abstract terms, the different activities of transition management are very similar to the different activities identified in many policy-process models in which problem-structuring, strategy formulation, implementation and evaluation are the core elements (for example: Winsemius 1986; Lindblom and Woodhouse 1993; DeLeon 1999; Ostrom 1999; Sabatier 1999). Initially, policy sciences formulated these activities as phases, suggesting a sequential ordering of these activities. These so-called phase models have been heavily criticised, leading to other defi-

nitions and terms to describe the policy process and its main elements (Van Twist et al. 2004). Transition management in a sense, reformulates the policy-process as a governance process on a societal scale. The first (predevelopment) phase can be seen as a phase in which in society a problem is defined, becomes urgent and alternative visions and solutions are developed. During the second phase, a window of opportunity opens for the alternative strategy and vision (often partly influenced by external forces) and concrete strategies are formulated. In the third (acceleration) phase an implementation of the alternative strategy and solutions takes place at the level of institutions and structures. And finally in the stabilization phase only marginal optimization occurs within the newly formed structures or system, leading to an evaluation of the process and formulation of new goals and strategies. Obviously such a conceptualization is a linear one, which is far from actual practice, where these different phases coincide and occur at different levels.

In historical transition studies, the following pattern always recurs: a problem emerges, alternatives are negotiated, action is taken and a new balance emerges. These different elements can be related to the three levels distinguished; the strategic level as the level where problems are identified, defined and alternatives are formulated; the tactical level as the level at which concrete alternatives are negotiated, institutional changes are developed; and the operational level as the level at which plans and agendas are implemented. These activities can already be defined as a form of transition management in the sense that they drive societal transitions. The transition management cycle integrates and structures these different clusters of activities of a transition management process. The transition management cycle provides a basis for a participatory process with an open end and a large degree of flexibility. A core characteristic of the transition management cycle is that it integrates substance and process, analysis and action. Based on the complex systems perspective, each activity-cluster in the process is informed by analysis and theoretical concepts, which in turn are only applied and adapted based on actual practice. The transition management cycle in fact does thus incorporate a continuous and iterative process, where within the cycle itself numerous cyclical and iterative processes occur. In operational terms, the activity clusters can be designed as process-phases, but we need to realize that the activities always intertwine, are carried out simultaneously and cannot always be distinguished from each other.

Strategic: problem structuring and envisioning

The 'first' activity cluster of the transition management process is that of problem structuring and envisioning. Transitions are about structural change, not only in terms of physical (infra-) structures, but perhaps even more about changes in worldview, paradigms and culture. A key element in transition management is therefore problem-structuring, which leads to a comprehensive viewpoint on a given problem at the systems level. By organizing the problem-structuring as a participatory process, it might lead to a shared conceptualization of the system at hand and the problems it is confronted with, and thereby also create a stronger sense of urgency to act. This broader, systemic conceptualization and 'problematization' of a societal problem provides the basis for reframing a societal problem and thus for developing new solutions and strategies. The convergence of the various problem perceptions is facilitated from the articulation of diverging per-

spectives of the actors involved, which in turn can lead to new insights into the nature of the problem(s) and the underlying causal mechanisms. It is, however, not evident that bringing together different perspectives automatically leads to integration; transition management needs to influence, structure and direct this process actively in order to work towards a shared integrative perspective. The insights that arise from the participatory process of problem-structuring prelude a change in perspective, which is a necessary but insufficient pre-condition to realizing a transition. A paradigm shift (new discourse) within a small group of individuals already takes a lot of time and energy, let alone the diffusion and internalisation of such a paradigm shift amongst large groups of actors in society. This is one of the reasons why transitions take so long.

Based on this new perspective on a complex issue and through discussion and interaction, a common language and discourse are developed. The language is the systems language in which actors can relate individual perspectives and interests to a collective level, without the necessity to fully agree. The shared discourse is that of the understanding that a complex issue can be understood by using a complex systems perspective, that the complex problems perceived are urgent and that a transition is required to realize a sustainable development. The understanding of a present-day complex system with symptoms of unsustainability is the basis for developing sustainability visions. These visions are particularly qualitative, inspiring, challenging and imaginative pictures of the future that define a structurally different, and more sustainable, state of the system. Based on the underlying assumption that it is almost impossible to achieve long-term structural change from within existing structures and via short-term steps only, this activity cluster is crucial for any policy or governance effort related to transitions and sustainable development. At a high level of abstraction (that of a societal system), a complex societal problem is in practice often defined and analyzed by a small group of innovative individuals. These are often opinion makers, trend-setters and generalists with overview and social authority. In other words, it is not the general public, nor politics or business who develop radical new perspectives and innovations, but individuals who may operate within existing structures, but nevertheless have a certain level of independence in thinking and acting. These actors bring their own perceptions of the transition issue from their specific background and perspective with them in a participatory arena setting.

Operationally, transition management focuses on these frontrunners to develop coherent, inspiring and meaningful new discourse and visions. Based on the governance principle of creating space for innovators outside, but not detached from, incumbent structures, the transition arena is used as an instrument to provide this necessary space and simultaneously be able to structure and guide the development of ideas and agendas between the innovators. These actors are involved in a transition arena on a personal basis and because of their own motivation regarding the issue, and not as a representative of their institution or based on their organizational background. While in practice these different roles and responsibilities are impossible to separate, within the transition arena an environment can be created that allows individuals to speak out freely. Competent facilitation and integrative structuring and process design can ensure that individual interests and perceptions do not dominate the discussions. The fundamental issue here is not that the existing establishment and interests

(incumbent regime) come together within the transition arena, but that niche actors, who can operate more or less autonomously, are involved. Indeed, a certain representation from the incumbent regime is necessary, also with an eye to the legitimacy and financing of the process of innovation. But here too, the focus is on innovative (niche-) individuals and organizations within the regime. A transition arena is not an administrative platform, new institution or consultative body, but a societal network of innovation and innovators; an experimental playground. The arena process is an open, evolving process of innovation that implies variation and selection: after a certain period of time some people drop out and others join in, ideas are dismissed and new ones formulated. Management in this context means creating sufficient space and favourable conditions for the front-runners, in such a way that the envisaged process of innovation begins to take shape. It does not mean bringing together a wide range of bodies around the arena, such as a steering group, a consultation group or advisory board, because that is exactly the recipe for limiting the space for innovation and management that has just been created.

This approach demands a critical selection of frontrunners, not by a 'gatekeeper' who selects who may or may not participate, but by an initiating team in which experts on the process and on the transition subject are involved, who will consider matters carefully. Although such a selection is by definition subjective, based on the characteristics of frontrunners in transition processes, the individual capabilities required to participate in such an abstract discussion and the requirement of involving all relevant societal perspectives, it is possible to outline generic selection criteria. The actors are thus individually identified and selected based on their capabilities, interests and backgrounds. There should not be too many actors (as a basis, 10 – 15 is sufficient for a representative yet still manageable sample) and they should not all have the same kind of institutional background and character or profile. These front-runners do not all necessarily need to be experts; they can also be networkers or opinion leaders. They should also be prepared to invest time and energy in the process of innovation and to commit themselves to it. And finally, it is important that there are an equal number of forerunners from the societal pentagon: government, companies, non-governmental organizations, knowledge institutes and intermediaries (consulting organizations, project organizations and mediators). By deploying a participative integrated systems approach, the complex problem(s) can be structured and made easier to understand (Rosenhead 1989; Hisschemöller 1993; Rotmans 1998).

Visions are an important management instrument for achieving new insights and starting points and therefore a change of attractor. Transition visions are integrative and coherent images of desired future system state(s), that have the function of what Dierkes has called: *Leitbilder*, or 'guiding visions' (Dierkes et al. 1992). In general, visions have different functions and different forms throughout processes of change, but for transition visions the over-arching goal is to stimulate a sense of shared direction and ambition amongst a variety of actors (Hajer and Poorter 2005). The objective obviously is to create consensus upon a long-term orientation and convergence in terms of action (this is referred to as 'congruency of meaning and action', (Grin and Van de Graaf 1996)). Berkhout, Smith and Stirling (Berkhout et al. 2004; Smith et al. 2005) are sceptical of the guiding visions as used within the transition management framework. They argue that guiding visions are contested and that the process of consensus build-

ing on these visions is problematic. Also, they argue that many historical transitions were not led by overarching visions of the future. In order to address this criticism we need to clarify the role and functions of guiding visions in transition processes. With regard to the functions of visions Berkhout et al. focus on mapping possibilities, target setting, heuristic device and metaphors. However, the primary function of visions in transition processes is its mobilizing potential: mobilizing efforts, resources, ideas and notions of a selective group of stakeholders ('forerunners') involved in a transition arena. The process of envisioning is therefore at least as important as the vision itself, one of the major findings of the VISIONS project (Rotmans et al. 2001; Van Asselt 2005). Transition visions are no fixed end-points but evolutionary futures. This means that visions are adjusted in case new knowledge, insights and lessons are learned during the transition management process. Transition visions thus differ from regular (policy) visions, which are often policy documents developed by experts. Because these visions are defined as 'products' they often lead to bureaucratic processes and the idea that a vision-document is the goal in itself rather than congruency (Hajer and Poorter 2005 39-40).

Visions in transition processes are not produced by regime-actors or experts alone, as is often the case with regular visions. They are developed by forerunners who function quite autonomously from the current dominant regime or their organization. So transition visions divert from ordinary visions produced by the regime, which are meant to support the dominant structures. Also, consensus on guiding visions in transition processes is not necessary, in the sense that multiple visions, consisting of a basket of transition images and related pathways might be developed. We have left the 'blueprint' idea of creating one overall vision and one road onto it behind us. In the early stage of a transition process we need a diversity of transition images and pathways. Later in the process one overarching vision will be selected based on what has been learned so far. Transition visions and transition processes are thus mutually dependent: visions are guiding in transition processes but transitions do also co-shape the visions developed.

Envisioning processes are very labour-intensive and time-consuming, but are crucial to achieve development in the desired direction. This direction, as long as a sufficiently large group of frontrunners supports it, provides a focus and creates the constraints, which determines the room for change within which the future transition management activities can take place. Combined, the shared understanding of the system (what it involves and what the problems are), a common language to talk about the system and its dynamics and shared expectations and ambitions about its future, form a new discourse which provides the basis for new types of action. Discourse is defined as an ensemble of ideas, concepts, and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices (Hajer 2002).

Tactical: coalition building, developing transition agendas

The change in perspective, captured in the new discourse, should be further translated to and made concrete within various networks, organizations and institutions at a less abstract level. On a societal scale, newly emerging visions and discourses confront existing regimes with their own conservatism and rigidity,

and questions the extent to which these existing regimes still deliver the societal benefit they used to. The new paradigm of sustainable energy, whatever it may include, for example, does at the least question the activities related to fossil fuels. This tension, however, only becomes concrete when the alternative vision becomes strong enough to threaten existing regimes (or when these regimes weaken). In concrete terms this means that the vision is translated into increasingly concrete, tangible, possible and in general favourable alternatives. At this level, the broad visions are translated into specified goals, concrete actions and new ideas by a type of actors different from the strategic level. Here, organizations, business, scientists, NGOs and other actors participate who have a stake in promoting and supporting the new direction. Companies invest in new technologies, NGOs stimulate awareness and scientists underpin the possibilities of the new developments or underline the inherent problems with current regime developments. These actors build their own networks and coalitions to further their own contributions and develop strategies to achieve their own strategic goals. In this way, a network of actors and actions emerges that is not consciously or by plan working together, but because they share a similar over-arching long-term direction they are contributing to a collective process. Their activities essentially have an impact on the incumbent regime because they aim to develop new structures, practices, technologies and such.

Tactical transition management focuses on the structural (regime) barriers to development in the desired direction. Such barriers include regulatory, institutional, economic and technological conditions but could also involve consumer routines, physical infrastructures or cultural aspects. In an expanding transition network (based on the transition arena) the new discourse is further refined and translated into action by self-formed coalitions. The first instrument to achieve this are transition images: collective images of the future that fit within the overall vision and make this concrete on a sub-system level. These transition images are defined at the same level as strategic sector-specific plans, thematic strategies or strategic innovation programmes. For instance, transition images could be defined for: biomass energy (energy), public transport (mobility), economy and education (a region) or waste management infrastructure (waste). Such demarcations are arbitrary, but need to fit with the 'natural' demarcation within society. The transition images are translated into so-called transition paths: routes to a transition-image via intermediate objectives, which, as they come closer, can be formulated more quantitatively. Different transition paths can lead to a single transition image and conversely a single transition path can lead to several transition images. A transition path is fundamentally different from a (transition) scenario in that it is a combination of strategy and (back- and forecasting) scenarios. It thus also contains intermediate goals and the actions foreseen to be necessary to achieve those goals. In this tactical activity-cluster the interests, motives and policy of the various actors involved (non-governmental organizations, companies, governments, knowledge institutes and intermediaries) come out into the open, and there will be negotiations about investments, and individual plans and strategies will be fine-tuned. When shared transition paths have been developed, these can also function as a means to integrate and adjust individual agendas and ambitions. While at the level of individuals specific interests dominate, we can find overall issues, goals and problems in the context of a network, sector, branch or community. The actors who should be involved at

this stage are those who represent one of the organizations involved and who are willing and able to invest and participate in the transition management process for a longer period of time. Participation here thus means an (uncertain) investment in time before concrete spin-offs in terms of funding or other results are realized. Within this tactical layer actors are recruited who, in particular, have sufficient authority and room for manoeuvre within their own organization and who also have insight into the opportunities for their organization to contribute to the envisaged transition process. An important condition for this is that the actors involved have the capacity (competence) to 'translate' the transition vision and the consequences of this to the transition agenda of their own organization and motivate new actors to become involved. Here, the instrument is used of the transition agenda: a combination of the overall problem definition and vision, the transition images and paths and above all a number of joint objectives, actions points, projects and instruments to realize the objectives. Specific focus within this context is on the division of labour, responsibilities and tasks in the agenda.

A shared agenda for such a network provides a basis for cooperation without the loss of individual goals and interests. Transition management tries to use the development of the transition agenda thus to create communities who hold shared beliefs and ambitions, very much like advocacy coalitions (Sabatier and Jenkins-Smith 1999), and who advocate, promote and try to implement this agenda. A transition agenda therefore does not need to be fully consistent or based on consensus at the level of ambitions, goals, beliefs and expectations. In a sense, a transition agenda more or less needs a certain element of dissent, conflict and difference of opinion so that it facilitates innovation, competition and learning. It does also contain the tasks and responsibilities of the actors involved regarding the strategies identified in the agenda, similar to regular policy agendas (Dirven and Kusiak 1999). A key aspect included in a transition agenda, is the element of learning objectives and expectations. A transition agenda is formulated for a longer period of time and is derived from a long-term vision and images as well as from perceived current-day problems, and thus includes expectations about future developments (which are in part based on actors' perspectives and worldviews) and learning objectives regarding these uncertainties. This differs from how agendas are treated in policy literature, where agendas are based on perceived problems and pragmatic strategies to gain attention for these issues. A transition agenda, and the transition paths, are in part explicitly targeted at questions, expectations and uncertainties regarding the desired changes and associated strategies. It is an agenda for structural change with a strategy to discover how this structural change might be realized, instead of an agenda for change with a strategy to realize this. In line with the transition theory, the transition agenda needs to be reassessed, evaluated and updated periodically based on new insights, knowledge and experience. Concrete agreement must be achieved upon possible coalitions to implement projects, actors who are able to lift specific barriers and the instruments (and policies) necessary for a successful next transition management phase. The transition agenda itself forms the compass for the frontrunners which they can refer to during their search and learning process. When the organizations and networks involved start to adjust their own policy and actions because of this operational process of searching-and-learning, tensions will arise between the transition arena and the everyday policy agendas.

Operational: mobilizing actors and implementing transition experiments

Operational transition management aims to create societal niches for innovation of all sorts and to connect and stimulate existing niches and innovators in such a way that their chances for success are improved. Part of the strategy is to involve a broad array of individuals and organizations, even citizens in general, in various forms: through debates, concrete projects, through communication, events, by drawing attention to individuals' initiatives and by calling on people's own responsibilities regarding sustainable development. The practical implementation of the broad new body of thought developed in the transition vision and agenda is quite demanding, because there are very many actors involved who all act from their own perspective, have conflicting interests, and are at the same time embedded in and dependent on a broader societal web. The other way around, actions and experiments carried out by actors also influence the new discourse, vision and agenda. In this activity cluster, there is increasing interaction and iteration between vision, agenda and practice. The vision and agenda create room for novel experiments and action while simultaneously the successful experiments and actions enhance support for the vision and agenda. While some activities might be directly related to the vision or agenda, others might contribute more or less by coincidence. There is a wide diversity of activities, for which the vision and agenda might come to function as an integrating and coordinating instrument, thereby stimulating interaction between experiments and actions and increasing the chances for modulation and emergence.

The focus of transition management at this level is to maximize the integrating, accelerating and guiding effect of the vision and agenda and simultaneously develop experiments that lead to the best possible input in terms of new insights, knowledge or options for the transition agenda. In terms of the evolving actor-network and the transition process, increasing numbers of actors, organizations, but also individual consumers and citizens, are involved in transition management. This is achieved by concrete projects but also by communication of the vision and agenda, public debate, media attention, manifestations et cetera. Regarding more hypothetical elements of the vision and agenda, transition experiments are defined and implemented. Transition experiments are practical experiments that can make a potentially large contribution to a transition process. Transition experiments (1) fit in a particular vision of how a sustainable and fundamentally different system would look like, (2) have by definition a poor fit with aspects of present society and (3) connect to other innovations and contribute to system innovations that can challenge the existing system (Van den Bosch and Taanman 2006). New transition experiments are derived directly from the developed sustainability vision and transition objectives and they fit within the identified transition paths. On the other hand, ongoing and existing experiments can be linked to innovation experiments that are already taking place, as long as they fit into the context of the transition. Often, many experiments are running concurrently, but these have not been set up or carried out systematically, so that any coherence is lacking. There is a diverse application for transition experiments from the vision and transition paths developed. These may compete, complement each other or investigate various options. Diversity is an important aspect, as long as these experiments at the systems level are in a position to contribute to the envisaged transition vision, which provides coherence to the diversity of experiments.

Transition experiments are by definition focused on experimenting and learning about different options and possibilities in the light of the long-term ambition and vision. Starting point therefore is not the potential of an individual option but the possible contribution hereof to an overall process. As with the vision- and agenda-building, the process of experimenting is an important instrument in itself for social learning. The dualism of the transition agenda (including concrete measures and strategies as well as uncertain expectations and learning goals) also necessitates and stimulates experimentation. Transition experiments offer room for experiment and creativity and are managed in terms of conditions (deepening, niche management) and in terms of diffusion (broadening and scaling-up) (Kemp and Van den Bosch 2006), in order to create the best possible circumstances for integration and combination of innovations, applications in other domains, new collaborations between actors or spin-off activities and ideas. In transition management, innovation is thus simultaneously actively managed as well as indirectly stimulated. The overall vision and agenda are designed to influence the selection environment, drawing in innovators who operate autonomously, and stimulating all sorts of novel activities. The actual transition experiments are designed to test, experiment and develop innovations of all sorts. One could say metaphorically, that transition management tries to create 'lock-ins' into desired, sustainable directions.

Evaluation and adaptation: closing the cycle

The different activity clusters described above (which in a sense can also be conceptualized both as levels and as phases) are followed by an evaluation phase, in which activities and their effect in the different phases and also the interaction between them is reflected upon. This is based on transition monitoring (Grin and Weterings 2005; Ten Pierick et al. 2006) of progress and (social) learning in the context of transition management. Monitoring is regarded as an ongoing activity that can be supported using specific instruments and methods, but which is not part of transition management as an identifiable phase. Evaluation of progress made is a 'natural' phase in any development process when actors involved re-evaluate their own action in the context of their own progress and also in the context of external changes. The evaluation and adaptation is therefore an explicit part of the transition management model and is used to stimulate modulation and further refinement of the transition management activities at all levels. It is based on the notion of social learning; through interaction with each other, cooperation in practice and reflection upon these activities, new insights are generated. This is a fundamentally different form of learning (*learning-by-doing and doing-by-learning*) than what is called first-order learning (transfer of knowledge), and is often linked to what is called second order-learning (reframing of one's perspective based on experience). Social learning takes place throughout the transition management process as a result of continuous structured interaction and reflection processes. The evaluation of the social learning processes gone through in the first activity clusters, is in itself a learning process (*learning-to-learn*), and may lead to adjustment of the developed transition vision(s), transition agenda and the transition management process within the transition arena. The interim objectives are evaluated to see whether they have been achieved; if this is not the case, they are analyzed to see why not. Have there been any unexpected social developments or external factors that were not taken

into account? Have the actors involved not complied with the agreements that were made? Once these questions have been answered, a new transition management cycle starts which will take another few years. In the second round of this innovation network the proliferation of the acquired knowledge and insights is central. This requires a specific strategy for initiating a broad learning process.

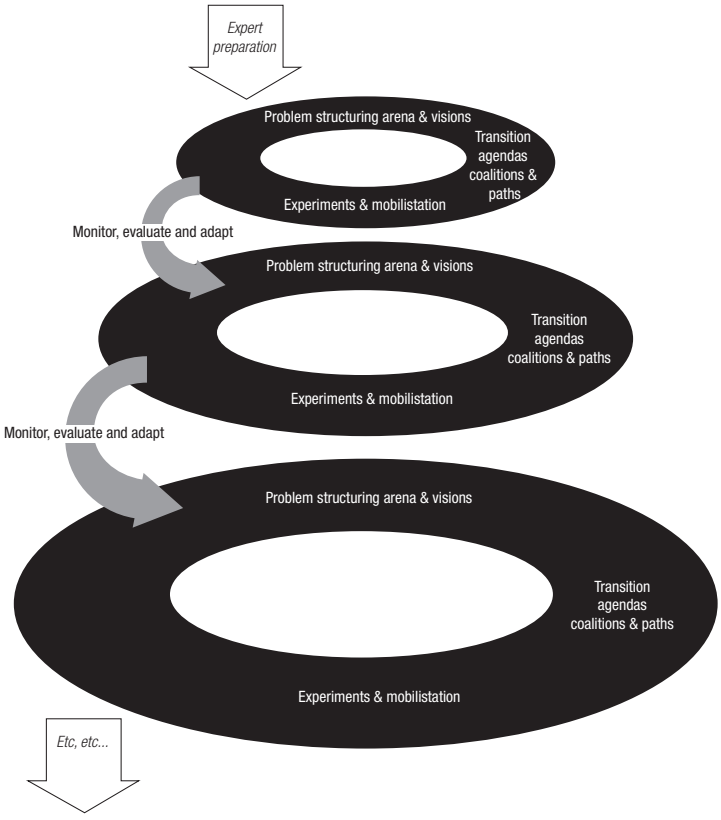


Figure 5.4 Different cycles of transition management

Because these transition management cycles take several years within a long-term context of 25-50 years, the creation and maintenance of public support is a continuous concern. When quick results do not materialize and setbacks are encountered, it is important to keep the transition process going and to avoid a backlash. One way to achieve this is through participatory decision-making. Societal support can also be created in a bottom-up manner, by bringing in experiences with technologies in areas in which there is local support. The experience may remove broader fears and give proponents a weapon. In general, the delicate balance between radical and innovative ideas on the one hand and the acceptance by the regime and possibilities for implementation hereof on the other hand, continuously requires attention. When alternative ideas are communicated

or presented too quickly, the regime might 'defend' itself and limit the possibilities for innovation. Controversial ideas can only become accepted when enough (public) support has been developed. Similarly, when alternatives are put forward too slowly and windows of opportunity have closed, it will be difficult to continue with those ideas and the momentum will be lost. The development and maintenance of public support is therefore crucial for the success of transition management (although it differs in different phases), especially when pressure on the regime is needed to have (elements of) the transition agenda accepted. The evaluation preludes a new cycle in which the same activity clusters are gone through but then more detailed and adapted, and perhaps in changed proportions. While in the first phases of a transition the development of a new discourse requires much of the energy and time, in later phases (e.g. acceleration) the tactical and operational activities take the forefront. Transition management is always context specific and throughout the process activities and instruments are selected based on the state of the transition and the most effective strategies to influence the ongoing dynamics. This is visualized in Figure 5.4 above.

This also implies that throughout a transition the objectives of transition management may change, different activities might become more important than others and accordingly roles of actors may change. Again, this emphasizes the need for a (complex systems based) analytical basis for governance: the state of the system (i.e. the phase of transition) determines the type of governance needed. Although we could never give a conclusive and closed model for how and when transition management should be implemented, a tentative coupling between the different phases of transition with the different levels of governance distinguished in the transition management framework is interesting. At the least, it shows that it could be valuable and important to consider reflecting more systematically on evolution of different governance styles and types and their respective use related to (societal) objectives. Table 5.3 gives an indication of the differences between activities at different levels in different phases of transition.

	Predevelopment	**Take-off**	**Acceleration**
Strategic	Problem structuring, envisioning, facilitation	Direction, leadership, facilitation	Legislation, regulation, institutionalization
Tactical	Agenda and strategy development	Coalition-building, networking	Integration and alignment
Operational	Knowledge production, experiments, innovations	Participating in debate, knowledge diffusion	Practice

Table 5.3 Changing transition management activities during a transition

5.4 An integrative and prescriptive multi-level framework

By combining multi-level and the multi-phase perspectives in an integrated framework, we can structure transition management activities in terms of what types of instruments should be developed and used and which types of actors

should be involved. Operational transition management aims at influencing the variation and selection process through creating room for self-organization, experimentation, learning and knowledge co-production. Tactical transition management targets incumbent institutions, regimes and structures in order to 'open them up' or tries to develop new, competing ones. Strategic transition management aims at redefining leading visions, ambitions and goals within the context of a constantly changing society. In effect transition management thus comes down to dealing with a multiplicity of steering activities by different actors and driving the activities in a shared and desired direction. To this end, different transition management instruments can be used for different types of transition management (transition arena, transition agenda and transition experiments) and different actors are involved based on their competences, knowledge input and role. During the transition management process, an increasing number of actors are or get involved in operational activities while only a relatively small number of actors will be involved in strategic activities. Simultaneously, with its actively organized and coordinated process within the transition arena, transition management tries to influence related governance activities elsewhere in society. In operational terms, the different types of governance activities can be described as different phases and can be visualized as a cycle. Combined, this creates a multi-level, multi-phase framework for analyzing, structuring and influencing transition management activities. It does so by specifying different types of governance activities, different types of (systemic) policy tools and instruments and for selecting specific process steps and actor-strategies based on analysis of ongoing (governance) dynamics.

Societal change from the transition management perspective is the result of co-evolution between developments and different types of governance activities. The processes, dynamics and sorts of output differ at each level (e.g. strategic, tactical and operational) and their societal relevance and policy impact differ over time. In order to manage such co-evolutionary and semi-informal networking processes throughout a transition, we need to emphasize once more the importance of the complex systems underlying analytical perspective. When involved in actually organizing and influencing the various governance processes that underlie an overall transition process, the relative impact of different activities as well as how to organize and structure their co-evolutionary interaction becomes even more important and complex. To do justice to this complexity as well as to allow for enough flexibility to adapt an ongoing management process to actual societal and process dynamics, the transition management framework can only be of use when continuously attuned to an analysis of actual system and process dynamics as basis for the selective participatory approach. The framework can be used to specify the goals of transition management in a specific transition and in terms of different types of governance activities. It can be used to relate these to the appropriate governance activities, instruments and actor capabilities necessary for them. In this sense, the framework functions as a structuring tool for the process of transition management: to select participants, specific policy-tools or methods (or at least categories of these) and reflect more systematically on the goals and desired output of different activity clusters and types of governance activities. In the table, only transition management-specific instruments are included, but the framework also provides a basis for selection of regular policy tools and methods. A strong advantage of this integrated ap-

proach is that participation can be based on process-based criteria and related to the different activity clusters and types of transition management, while avoiding to become overly prescriptive or rigid. The framework is shown in Table 5.4, but it is obvious that the actual details in the table are neither extensive nor validated. The table is given to illustrate its structuring capacity and needs to be re-evaluated once used. The actual choices based on the framework regarding an operational transition management process need to be discussed and adapted when necessary.

Type of governance activity	Goals	Activities	Transition Instruments	Capabilities
Strategic	Integration	System demarcation problem structuring	Integrated systems analysis	Systems thinking
	Giving direction	Envisioning	Transition Arena, Transition visions	Creativity, guts, innovative ideas
	Reframing	Exchange of perspectives, developing new discourse	Transition Arena, Integrated systems analysis Transition vision	Communication and network skills, integrative capabilities
Tactical	Translating	Developing inspiring images, strategies	Transition images, transition paths	Creativity, independence
	Agenda-building	Exchange of goals, negotiations, shared goal-formulation	Transition agenda transition coalitions	Thinking in terms of co-production, negotiation skills
	Networking	Coalition building	Transition paths Innovation networks	Communication and consensus building
Operational	Innovation	Experimenting	Transition experiments, testing grounds	Learning and communication
	Development	Implementation	Experiment portfolios	Project management
Evaluation	Social learning	Monitoring and evaluation Inventory of learning experiences	Transition monitoring	Expert knowledge Structuring skills
	Adaptation	Adjustment of vision, agenda New experiments	Participatory evaluation	Reflexive thinking Reflexive attitude

Table 5.4 The transition management framework (Loorbach 2004)

5.5 Conclusions

In this chapter we created a bridge between the descriptive transition management approach and an operational governance model, to be introduced further

in the next chapter. The transition management framework provides this link by structuring different types of governance according to their level of abstraction. The three different types of transition management described in this chapter are not deterministic: they concern fluid, interacting and co-evolving processes of governance. In practice, we can witness these different types of governance activities at all levels of a societal system, the transition management framework enables us to analyze and structure these activities. The aim of transition management is to align at these governance activities that are directed towards sustainable development and enhance the chances for a breakthrough and upscaling of these activities. This is achieved through a structured participatory process across and between these different types of transition management.

We have translated the three types of transition management into a process scheme that distinguishes four different activity-clusters and we have integrated this with the complexity governance perspective. A transition arena is used as an instrument to connect innovators within the system, structure a complex societal problem and develop a shared vision. Transition networks and coalitions are used as means to involve specific organizations and interests and have these contribute to the desired change at the level of structures, routines and regulations through the development of a shared transition agenda. Transition experiments are the context in which possibilities and barriers for the transition agenda are explored and a wide range of actors is involved. Transition monitoring and evaluation are seen as cross-cutting activities that need to generate interaction and modulation between the different types of transition management and instruments used. It is made explicit as an identifiable activity in the transition management process but takes place in the context of all three types of transition management. When organized in a transition management process, this structure can be visualized as a cyclical process. Combined, the multi-level, multi-phase framework provides a heuristic to analyze and structure transition management processes. It can thus be used as an analytical instrument (see Chapter 7 on the waste transition) as well as a basis for the transition arena model (see Chapters 6 and 8 on the Parkstad Limburg transition arena) or both (see Chapter 9 on the energy transition). The operational transition arena model is based on the transition management framework and presented in detail in Chapter 6.

Obviously, the presented transition management framework has its limitations. The first is that it is no prescriptive or blueprint framework. Every (transition) practice is unique in terms of context, actors, problems and possibilities for innovation. The framework can certainly be used to develop a context-specific operational approach, but it can never be implemented without adaptations, additions and improvements. The second limitation is that the transition management process itself is never so structured or sequential as the framework might suggest. In practice, the different types of transition management coincide and are influenced by unexpected developments in the environment. The third limitation is that during the actual process management, process management capabilities, participatory skills and all sorts of other capabilities and competences are required. These are not prescribed nor offered by the framework. Knowledge of and experience with tools and instruments for process management and related activities is therefore indispensable. To this we will turn in the next chapter.

Chapter 6

The Transition Arena: implementing the approach

6.1 Introduction

Managing transition processes is neither predictable nor straightforward. As mentioned before, transitions are long-term emergent processes that cannot be planned or directed. However, based on intelligent analysis and integration of knowledge and practices and through intelligent coordination and organization it is possible to influence and guide transition processes. Traditional political and policy institutions are mainly focusing on relatively short-term and domain specific policies, and do not facilitate multi-actor processes that start from complexity and diversity and ambiguity of problem perceptions, goals and means. The regular policy arenas and institutions are thus unable to facilitate long-term and uncertain governance processes. We therefore need new innovative governance arrangements and instruments that enable and facilitate transition management activities (VROM 2001; Rotmans et al. 2004). Core characteristics of such arrangements are involvement of various and different relevant actors (multi-actor) and a long term focus on innovation and learning (Rotmans and Loorbach 2001).

Consensus building in participatory policy-processes has been a central feature of Dutch political culture for decades (the so-called polder-model). Over the last decade, different new multi-actor arrangements have been developed to facilitate these participatory and consensual policy processes such as Communities of Practice or CoPs (Bood and Coenders 2003), innovation networks (sustainable agriculture: http://www.agro.nl/innovatienetwerk) (Dirven et al. 2002), task-forces and platforms (energy transition: www.senternovem.nl/energytransition). These novel approaches are examples of innovation in government and democratic processes. Also, new instruments and methods have been implemented and (further) developed: interactive policymaking (Klijn and Koppenjan 2000), participatory methods (Van Asselt 2002) and scenario and envisioning tools (Rotmans et al. 2001; Van Notten 2005). The interrelations between the different concepts, approaches and instruments are lacking in practice; there seems to be no overall integrative framework or analytical basis for the use of specific tools and instruments.

This thesis not only aims to develop a theoretical argument, but also aspires to develop a model for implementation of the transition management approach in practice. For this, the different key elements and instruments of transition management need to be integrated in a process model. This chapter presents the model for transition management as developed for, and implemented in the Dutch political culture. This model has been specifically applied in the Dutch policy context and therefore does not present a blueprint model for managing transitions in any political culture (although recent experiences in Belgium suggest that the basic model provides a valid basis to start from). The approach presented in this chapter, however, must be regarded as a generic approach which can be translated to different political cultures, depending on their specific characteristics (Wijers 2004).

In essence, the transition arena (TA) model is based on a network approach. The network approach originated in organizational and management sciences in the 1970s and later found its way into social and political science in the 1980s

and 1990s (Marin and Mayntz 1991; Scharpf 1994; De Bruijn 1997; Kickert et al. 1997; Peters 1998; Eising and Kohler-Koch 1999; Milward and Provan 2000). The network approach views society and actors in society as interrelated in networks. Decisions made by actors are determined by the actors around them and the expectations of how these are going to (re-) act. Political and policy scientists have taken up this perspective to develop new management concepts that address the new reality of policy making as multi-actor governance. Concepts such as interactive and participatory policy-making, network- and process governance and management and reflexive governance are examples (Teisman 1992; Kooiman 1993; Rhodes 1996; Kickert et al. 1997; Bruin 1998; Eising and Kohler-Koch 1999; Pierre 2000; Voss and Kemp 2005).

In this chapter we present the transition arena model as a meta-instrument for transition management. The model is a result of theoretical principles underlying transition management, combined with empirically driven methodology. The transition and transition management theories provide an integrative framework that is used to develop specific use and function of different existing approaches and methods. For example, within the context of transition management, existing policy instruments and process methods can be used in a specific manner and in the context of a more long-term transition management process (Loorbach 2004). This ranges from the selection of participants and the use of specific process methodologies like scenarios and visions to the use of participatory or even regulatory policy instruments. As presented here, the transition arena is the result of four years of theoretical development and simultaneous experimentation in practice as reflected in other chapters. The TA is therefore a balanced result of practical experience and of theoretical reflections.

Although the TA model is not meant to be a blueprint approach and each transition context will pose different and challenging problems regarding the implementation of transition management, it does provide a framework for implementation of transition management in a far more refined and coherent form than any other policy method or model. However, using the TA model is no guarantee for successful transition management, nor is it a necessary condition for a transition to take place. Just because a transition arena process is also uncertain and highly complex, there are no guarantees for success, but if properly implemented it certainly enhances the chances that an ongoing transition process can be influenced in a desired direction. As we have seen in different cases (Verbong 2000; Loorbach et al. 2003; Van der Brugge et al. 2005), different historical transitions have been influenced by small groups of innovative actors in a strategic and transition management-like way. But a perhaps even larger number of transitions either have emerged (for example the demographic transition, information technology and economic transition), or have been managed more or less top-down (past WWII agricultural transition, the welfare state) (see the transition-typology in (Rotmans 2005))

6.2 Goals and position of the transition arena model within transition management

The transition arena as a multi-actor governance instrument intends to stimulate and coordinate innovation through creating shared (new) problem definitions

and shared long-term goals. The transition arena model is rooted in the insights from new modes of governance, complex systems science and transitions as presented in Chapters 3 and 4. The transition arena is a virtual arena, an open and dynamic network in which different perspectives, different expectations and different agendas are confronted, discussed and aligned where possible. As such, the approach is similar to network- and process management approaches (Kickert et al. 1997; De Bruijn et al. 1998), but it is different because of the intimate interrelation between the substance and analytical process (complex adaptive systems framework) on the one hand and the network and multi-actor process on the other. Another distinguishing characteristic is that the transition arena approach is normative based on an explicit focus on sustainable development. But rather than being confronted with prescribed goals and outcomes, in the transition arena the participants themselves set the conditions within which the process evolves and influence the direction and speed of the process through their interaction.

Network-governance approaches without any close ties to the substance of the process or approaches without any normative direction will not be able to provide sufficient guidance in terms of long-term societal change. Since complex social networks *an sich* do not have a direction, and societal dynamics is both unpredictable and random, a governance approach where process structure is based on integrated analysis and which provides the tools and context to reflect normatively on the direction of development, is necessary in the context of transitions and sustainable development. Integrating the network perspective with the complex adaptive systems approach applied to societal systems, offers interesting possibilities for combining analytical and process approaches, tools and methods. Societal systems evolve because of autonomous developments and surprises and because of interventions and decisions from actors. Transitions in this perspective are the result of co-evolution between the societal system and the actor networks.

Based on theoretical considerations (mainly insights from complex systems theory, governance concepts and sociological models, see also Chapter 3) as well as on lessons learned while implementing and adjusting the model (see Chapter 8), the transition arena model as presented here has emerged.

Governance principles TM	**Transition arena starting points**
Multi-actor policy making	Equal representation of actors with different backgrounds
Multi-perspectivity	Integrated Systems approach and analysis
Innovation nucleus	Small group of (innovative) actors
Transition and long-term (structural change)	Long-term visions as frame for short-term action
Keeping options open	Multiple target images and transition paths
Experimenting and innovation	Experiment-portfolio
Dealing with uncertainties	Using scenarios and cyclical adaptive process design
Learning and reflexivity	Monitoring and evaluation

Table 6.1 Transition arena starting points

The ultimate goal of transition management is to create new societal dynamic processes that 'disturb' existing institutions and structures and lead to new interrelations between actors and institutions. Such a largely unpredictable and at first fragile process is not possible from existing structures or institutions. One of the main meta-level goals of the transition arena therefore is to provide room for the development of (institutional and cognitive) innovations outside the existing regime. In essence, the TA is the instrument that has to enable a self-organizing and self-steering participatory process, which leads to a guiding and inspiring long-term orientation and short-term experiments that support it. Because of the innovative ambition, the TA needs to be a testing ground and experimenting room for new ideas, concepts and practices. As such it can be considered a meta-instrument for transition management that creates the institutional space for transition management activities.

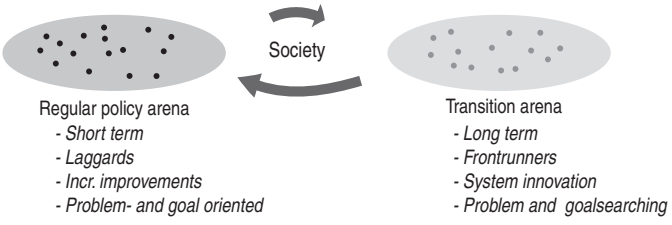


Figure 6.1 The transition arena as policy niche

In terms of the multi-level model of transitions, the transition arena can be considered in its first phase as a niche; one could even define it as a policy-niche to the existing policy-regime. During its course of development, the transition arena becomes increasingly connected to the regime and its dynamics. In this phase transfer of ideas and agendas takes place between the transition arena and regular policies, before the transition arena needs to diverge again from the regime. This process of convergence and divergence is a unique feature of the transition arena model, and in practice one of the most difficult yet important aspects to manage, as we will also show in Chapters 8, 9 and 10. The process and substance of the transition arena are structured in such a way that they will use and influence the multi-level dynamics in a subtle way. By combining integrated system analysis of the macro-, meso- and micro-level dynamics and developing an integrated strategic innovation agenda based on the system dynamics, the objective is to stimulate and reinforce modulation dynamics causal to transitions. Abstractly speaking, the TA switches between and connects the meso- and the micro-level and is thus positioned in between these two levels.

A TA is only possible when legitimized by individuals operating in the context of a regime, at the strategic level. Such an individual recognizes the need for structural change and in fact can co-create a new niche for policy-change. Paradoxically the regime, itself the greatest promoter of the status quo, thus needs to make possible its own restructuring in the long-term. In practice, this implies that although transition arenas are legitimized and often (financially) supported

by regime actors, the arena process is at the same time often developing in a way contrary to major regime interests. In time, the transition process will become threatening (at least to parts of the regime and certain regime actors) and needs to be protected against short-term interests and downscaled or adjusted ambitions and goals at the regime level. The arguments for setting up a TA can be various, but in all case studies it seems that the predevelopment phase of transitions is a very important phase in which the conditions for an arena are set. In general, because the regime needs to allow for and sometimes even supports a TA, the conditions under which the TA operates, the products they produce and the structure and coordination of the process are subject of negotiation. Regime actors thus have and play different roles. Some innovators and outsiders will undertake possibly threatening activities, while the majority of the regime actors will monitor the developments but wait passively for what will come out of the process. They do, however, tolerate the activities because of various reasons (non-threatening character, small-scale, long time horizon, uncertainties about outcomes etc.) and thus legitimize them. Regime-actors will try to maximize control while the TA needs to minimize it.

The TA is initially an instrument at the strategic level of transition management. The goals at that level are the development of shared problem definitions and long-term visions and goals strong and inspiring enough to function as a new societal attractor. It is also the instrument to initiate and stimulate strategic transition management from which the other types of transition management (tactical and operational) originate. Based on the process in the strategic TA, different sub-themes (related to sub-transitions) can be selected (in practice between 3 and 5 themes) that often are perceived as sub-systems. In terms of involved actors, the arena is broadened by involving more domain- or theme-specific actors that represent specific interests, stakes or organizations. By mixing different actors involved in the strategic TA with new actors in sub-networks, a structure of 'arenas of arenas' emerges (see Figure 6.2).

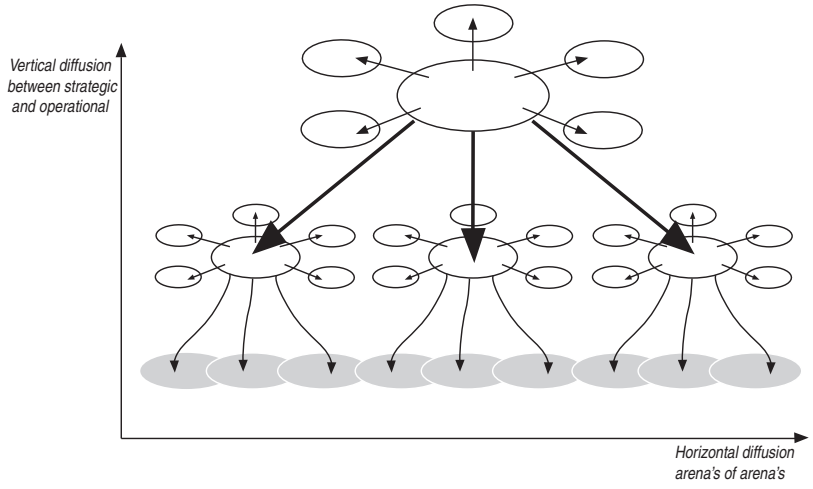


Figure 6.2 Creating arenas of arenas at different levels

At the tactical level of sub-themes (sub-transitions), the process focuses more on negotiation and converging interests on the mid-term than on strategic objectives. While the new sub-networks share the basic problem definition and long-term orientation developed in the TA at the strategic level, they translate the generic concepts and principles to specific themes and domains. In this way, the transition management process spreads from the strategic to the tactical level where ultimately the transition agenda is set. When this phase has been reached, the process becomes increasingly self-organizational because of the number of actors in the network, the commitment to the transition process and the concrete level at which plans and strategies are defined. Of course this is no guarantee that the envisaged transition will happen (we are still referring to the transition management process), but the actors involved will use the ideas from the transition agenda in their daily context, and the overall sustainability vision will increasingly be used as reference for formulation of policy plans on all levels with different actors.

The transition arena model is based on the transition management cycle (Chapter 5), which consists of 4 phases:
- Transition arena
- Coalition- and agenda-building
- Experiments
- Monitoring and evaluation

Table 6.2 gives an overview of the main activities involved in transition management.

Transition arena phases	Process	Substance
Expert preparation	Process design Actor selection	First integrated systems analysis
Strategic	Developing transition arena	Problem structuring Sustainability vision
Tactical	Arenas of arenas Coalition building	Target images and paths Transition agenda
Operational	Setting up experiments Network development Mobilisation	Knowledge Experience

Table 6.2 Activities in transition management

In the transition arena, the process is based upon an expert preparation phase where the process as well as the transition topic is prepared. The final phase in the transition management cycle, monitoring and evaluation, is a continuous activity throughout the process, and as such not a phase similar to the others in the model. However, after going through the first phases, a 'natural' period of evaluation takes place, which can and needs to be facilitated and stimulated. This evaluation leads to adaptations and adjustments in terms of process and substance, influencing the next round of transition management. The first cycle

from expert-preparation to the implementation of the first experiments takes roughly 2-4 years.[12]

The end of the cycle is also the phase in which the transition arena and the regular policy arena converge and ideas from the transition arena find their way into regular policies. It is then often necessary to create new space for the transition arena to re-assess the vision and agenda and the need for innovation. However, the attention and interest in the transition management process will have grown, so a new group of actors can be involved in the process, furthering the innovation agenda based on lessons learned and new societal- and regime-developments. The focus in a second round will shift more from the problem structuring and envisioning to the transition agenda and especially to the experiments and practical concerns. The vision will only be discussed in terms of consistency and plausibility in light of the lessons learned and new developments. Fundamentally, the basic principles underlying the sustainability vision need to be supported, otherwise the overall need for and necessity of the developed transition-network and –agenda need to be reassessed. In practice, this will mean that in a next round in most cases the overall vision and direction will only slightly change, and tactical and operational matters will become more important and require more attention during next transition management rounds.

6.3 The Transition arena model – operational and methodological approach

In this section we present the TA model, which is based on theoretical considerations described in previous sections as well as on experimentation in diverse cases. The TA model can be seen as a meta-instrument for transition management and is basically the multi-actor context in which the transition management process takes place. In its first phase, the transition arena is a relatively small network of innovators and strategic thinkers from different backgrounds who discuss the transition-problem integrally and outline the transition goals. Further on in the process, the network will expand to include less strategically oriented actors (such as local authorities and people with practical knowledge about processes of change) to develop transition paths and link these to existing dynamics. Finally, short-term experiments and actions are derived from the goals and paths, and more practically oriented organizations and actors will be involved.

Expert preparation phase

Integrated systems analysis (ISA) — To prepare the arena process and provide the scientific and factual basis for the development of integrated problem definitions and visions, an integrated system analysis needs to be executed by experts. There are a number of methods available from integrated system models (Rotmans and De Vries 1997; Schnellnhuber and Wenzel 1998) to 'soft system approaches' (Checkland and Scholes 1990). In the transition arena approach, we make use of

12 This is based on experiences from transition arenas in Parkstad Limburg, the Ministries and in Flanders. Implementing the transition arena model at lower levels of scale, such as cities, sub-sectors or organizations, could lead to shorter cycles.

the SCENE-model (Grosskurth and Rotmans 2005) which combines the possibilities of quantitative models with the participatory benefits of qualitative models. The SCENE-model is a basic stocks- and flows-model based on sustainability as a balance between economic, ecologic and socio-cultural domains. Besides being used as a quantitative model, the SCENE-model is also used as a qualitative and conceptual model that enables integration of perspectives, discussion about interrelations between interests and different developments and facilitates coherent development of strategies. For the benefit of a more comprehensive transition analysis and to support the transition management process, the SCENE-model is complemented with a multi-level and multi-phase analysis based on the transition concepts. Together these analyses constitute the Integrated Systems Analysis (ISA). Although a structured and unified ISA methodology is so far lacking, the first attempts have shown the added value of ISAs with regard to integration of existing studies, synthesis of topics and integration of perspectives. See for examples: (Van de Lindt 2002; Rotmans 2004; Deraedt et al. 2005).

A first step in the ISA is to agree on a basic stocks- and flows-model. Integrated assessors and system analysts can develop a first version based on a rough study of available materials, general knowledge concerning the specific system and interaction with some key informants. In this basic model, the key components of a societal system are identified, taking into account the different societal domains. For each component (or stock), data is gathered and summarized. Examples of stocks are population, infrastructures, environmental quality, education levels etc. Most data will already be available but needs to be combined at the same level. An important final step is synthesizing the information and analyzing the state of the system in an integrated way, which can be done with an increasing level of detail when funds and time allow for more rigorous and thorough participatory valuation of the system.

This analysis, which in a sense is a meta-analysis of the state of a specific societal system without much attention to different levels (distinctions between regime and niches for example) or different phases and speeds of change, needs to be combined with a historical analysis of how the specific structure evolved and with an analysis of the most important trends and developments that influence the system (macro-level). Finally, an inventory of micro-level initiatives and innovations concludes the basic system analysis. In parallel, an actor- and network-analysis needs to be performed in order to identify the key actors and networks currently influencing the system and those that are possibly important for system-innovation. In practice, the actor-analysis is partly done through interviews, in which the basic ISA is also discussed and the motivation and competences of different actors are taken into account in order to assess to what extend these actors would be willing and able to take part in a transition arena process.

An integrated systems analysis in general terms (based on SCENE or another systems approach or model) provides the starting point for strategy development and network building in the transition arena. This basis is important for two reasons. Firstly, it is the basis for a discussion on the unsustainability of the current state of the system. This can lead to a shared definition of the problem at the systems level and a shared sense of urgency to act upon this (in a sense, a need for transition). Secondly, it provides a common framework for and perspective on the transition topic. From a process point of view, the diverse group of actors

involved develop a shared and consistent mental image of reality and a shared language to discuss the topic. An integrated systems approach frames the complex issue in a certain manner and helps the participants to grasp uncertainty at the systems level, facilitating the convergence of a shared perspective. This is especially important because of the diversity of perspectives, backgrounds and knowledge involved in transition processes, often limited to specific domains or sub-systems. The analysis at the level of the system enables integration of perspectives and ultimately strategies. This approach is very similar to what has recently been called Integrated Sustainability Assessment: a systems approach embedded in a process context to achieve long-term sustainability goals.

- **Process goal**: creating the same basic level of knowledge/information; creating a shared problem perception based on a joint conceptual model
- **Substance goal**: gathering better knowledge on the complex problem in question, relevant information, structuring information

Actor selection — Contrary to the Dutch polder-model, the TA-model is selective in involving actors. Although on the longer-term the process opens up, engaging more and increasingly conservative actors, at first a small group needs to develop a basis for the transition. From economic and technological studies we learn that radical innovation is often a combination of new and existing elements (Schumpeter called this *neue kombinationen*). To create the possibilities for such new combinations to emerge, an optimal selection of actors would involve both innovative regime actors and innovative outsiders. In practice, the selection will focus on so-called frontrunners (Rotmans and Loorbach 2001; Dirven 2002) or niche-actors, whereby some can be involved from niches at the regime level. In this expert-preparation phase important actors are identified and interviewed. Social network analysis and the snowball-method (Coleman 1958; Scott 1991) can be used to identify relevant actors and organizations to be involved in transition management.

A first step in the actual multi-actor process is to select a relatively large group of actors who are in some way active in promoting sustainable innovation, influential in the system, or who are otherwise important for thinking about sustainability and change within the specific system. Practical experience shows (see Chapter 8) that a kick-off meeting where all these actors get an open invitation to participate, provides a good opportunity to inquire about the willingness and ability to get involved in and commit to a transition arena process. From this basic group, based on the above-mentioned selection criteria, a small group of about 10-15 people can be selected.

Practical experience with various transition arenas (see Chapter 8, Intermezzo II) has shown that although ultimately only 5 people are enough to lay the foundations (in terms of creating dynamics in a certain direction) for a transition, the TA model starts with a selection of about 15 persons from which a smaller number of actors will emerge that become the true frontrunners at the strategic level. In the later tactical phase, the arena expands to roughly 50-100 actors, who are selected based on different criteria from the actors at the strategic level. The selection process can also be part of the activities of the strategic TA where the involved actors invite actors from their own networks and/or indicate what type of actors should be involved.

The selection of participants for the transition arena is of vital importance; they need to reflect the complexity of the transition at hand, which is supported by the idea of requisite variety (Van Notten 2003; Vellema et al. 2006). This means that the most important societal perspectives relevant to the system under study should be represented. In general the relevant actor groups are government, business, knowledge institutes, NGOs and intermediaries. Furthermore there should be a representation of niche-actors as well as some innovative regime-actors. Finally there should be a mix of creative actors, communicative actors and networkers to ensure optimal effectiveness in developing the ideas as well as transferring them outside the transition arena. A good illustration of how different types of actors play different, but equally important, roles in spreading ideas, is Gladwell's idea of connectors, mavens and salesmen (Gladwell 2000).

Participants in the transition arena need to have some basic competences at their disposal: they need to be able to think at a high level of abstraction (system thinking), be able to communicate abstract ideas and have leadership abilities. They must function quite autonomously within their organization but also have the ability to convey the developed vision(s) and develop it within their organization. Apart from this, they need to be willing to invest a substantial amount of time and energy into playing an active role in the transition arena process. In terms of intellectual capabilities, arena participants need to be able to question their own paradigm and leave aside the concomitant everyday noise. It also requires insight and imagination to look ahead one or two generations. Last but not least it requires the ability to reach agreement among often diverging opinions.

	Process capabilities	**Substance capabilities**
Strategic	Networking skills	Systems thinking
	Communication skills	Creativity and imagination
	Guts	Problem structuring skills
	Ambition	General knowledge
	Leadership	Large network
	Vision	Abstract thinking
Tactical	Negotiation skills	Strategic thinking
	Communication and consensus building	Analytic ability
	Thinking in terms of co-production	Specific knowledge
	Open to new combinations	Innovative ideas
	Coalition building skills	

Table 6.3 Selection criteria actors

It is important to specify explicitly the criteria with which the participants of the transition arena are selected and to document these criteria. Through interviews not only the ISA can be validated, but key competences, skills and capabilities of possible arena-participants can be mapped out as well. To summarize, participants in the transition arena need to (i) have the ability to consider com-

plex problems at a high level of abstraction; (ii) have the ability to look beyond the limits of their own discipline and background; (iii) enjoy a certain level of authority within various networks; (iv) have the ability to establish and explain visions of sustainable development within their own networks; (v) to be able to think together; (vi) be open for innovation instead of already having specific solutions in mind. The table above summarizes some of the key capabilities that need to be represented in the transition arena.

- **Process goal**: selecting forerunners for the arena, involving actors around the arena, creating support for the approach
- **Substance goal**: building up a prerequisite of perspectives, having a first validation of the system sketch and boundaries

Strategic transition arena phase

The **strategic** level/phase of the transition arena is concerned with the integrated assessment of the problem and the development of a shared, overarching direction of development. The process consists of formulation of a joint problem perception, an exploration of possible future development trajectories and development of a transition vision. Process here is as important as substance; the result of this phase should be social learning in the sense that the actors have learned about other actors' perspectives and values, about the complexity of achieving sustainable development, the uncertainties regarding the future but also about the possibilities of influencing change and possibilities of cooperation. Actors will, after this phase, have reframed both problem and solution (strategy).

Shared problem definition — The starting point for transition management for sustainability is that there is not one single problem but many problematic aspects of a given situation and of the solutions. Different actors will have different views on the nature of a problem and some sort of tuning process will be needed to identify a shared course (Rosenhead 1989; Hisschemöller 1993). Often these are not single problems but a range of problems. In the field of energy, for example, problems are dependent on scarce (non-renewable) resources (oil, natural gas), emissions of greenhouse gasses stemming from the combustion of fossil fuels causing climatic change, price volatility from shortfalls in supply often as a result of wars, and the military conflict over oil resources and oil power. In order to arrive at shared definitions of a transition problem, such different perspectives have to be recognized and made explicit. In practice, this is however difficult and often a very uncertain process.

Problem structuring in the TA model is based on the Integrated Systems Analysis, which is presented in its first draft version as a collection of facts and data. The discussions in the transition arena are structured in such a way that the different interpretations of these facts and data of the different actors are made explicit. This way, the different perspectives of the arena participants are confronted and in a sense negotiated. Because of the integrated nature of the ISA, the interrelations between the different system-elements (stocks) and the positive or negative impacts of these interrelations are also discussed. The basic SCENE-model or mental systems model is very useful in this phase for structuring this debate at an aggregated level. During the course of a number of intensive

discussions, which need to be structured and facilitated, convergence of problem definitions and system-definitions can be achieved.

The problem-structuring phase is very much a search- and learning process. More often than not, the different actors involved will claim that they already know the problem at hand (while in fact they think of their particular problem definition), they will think the discussions a step back (they want to talk about solutions rather than problems) or state that everybody already knows it (the system study presents no new information, the innovation is in the integrative and synthesizing character). Also, commissioning institutions or actors responsible for the process and its outcomes will also often question the relevance of this phase and press for discussion about solutions and actions. However, this phase of the process is crucial later on in thinking about possible solution strategies, agendas and experiments, since for these matters a necessary prerequisite is a shared perception of the system, a mutual understanding of the issue and an understanding of the other participants' perspectives and values.

- **Process goal:** creating a shared sense of urgency, developing a shared language
- **Substance goal**: developing a shared mental map of the system and a common understanding of the problem

Transition vision and shared guiding principles — When the transition arena agrees on the nature (definition) of the complex transition problem, this opens up the discussion for thinking about a desired state of the system as opposed to the perceived unsustainable current state. This phase is thus aimed at the development of a transition vision: *an inspiring and attractive sustainability vision, which comprises the desired sustainable future state of the system*. As we have argued in Chapter 5, transition visions on a radically different system structure could function as a new attractor guiding short-term actions. These transition visions then have to set the conditions or criteria under which societal actors agree a societal system should function in the future. In a sense, these are defined as the sustainability criteria for the future. In order for a transition vision to function as a new attractor, there are conditions attached to the substance of the vision as well as the envisioning process itself.

In the TA model, the transition vision is based on discussions about a desired state of the stocks (the basic SCENE-model) in relation to the problem definition and problem analysis. Here, the development of a transition scenario can be helpful. Transition scenarios explore the possible development pathways to the desired future state at the systems level. In an iterative process between the vision and the scenario-development, a coherent overall image of a desired future and a storyline on how this future could emerge, is developed. The transition scenario also includes insights in and assumptions on how dynamics intertwine and reinforce each other at a sub-system level, which forms the basis for developing transition paths in a later phase (Sondeijker et al. 2006). From these discussions shared principles are derived which are formulated as shared guiding principles for sustainable development. To avoid developing a one-dimensional vision, the shared goals are prescriptively formulated in terms of sustainability criteria; conditions under which the actors agree the system under transition can be called sustainable. Examples are an energy supply that should be emissions-neutral, cost-efficient; or an agriculture that should be animal friendly, focused

on product quality etc. These principles are developed in iteration between the often chaotic and seemingly unstructured discussions in the transition arena and the transition management team responsible for preparing the (next) session.

Its primary goal is to come to an agreement or consensus on the desired future conditions and guiding principles. Paradoxically, in terms of transitions there is a natural consensus to be found at the overall level about the need for transition and the normative goal of sustainable development, while the actors may strongly disagree on preferred solutions or strategies on the short-term. Through this process, the organization of which is a responsibility of the transition management team, an overall idea of what the desired future state would look like in technological, socio-cultural, institutional, economic and ecological terms will emerge. With the use of creative sessions and through the use of visual and communication experts, the overall 'picture' can be developed, visualized and communicated. Examples of transition visions that would meet the guiding principles for the energy transition (cost-efficient, safe, clean), are the hydrogen-economy or the all electric society (Van Hilten et al. 2000); for agriculture, possible visions could be 'no agriculture' or 'closed production regions'.

It is of crucial importance that the actors involved internalize the process of developing a transition vision, so that they are able to translate the vision to their daily context and are able to communicate the transition vision and inspire other actors. The process of thinking about a desired future is thus even more important than the transition vision itself; through the interaction within the group, the integrated perspective on the future and the prolonged reflection on both problem and the meaning of sustainable development in a specific system, a new way of thinking emerges that these actors (who are in fact selected based on having this competence) can translate into their own daily practice. Also, the actors involved build confidence that other actors (groups) will subscribe to the transition vision and that a common interest in undertaking a transition effort will develop.

- **Process goal**: creating a shared direction and ambition
- **Substance goa**l: agreeing on shared development criteria, selecting transition themes

Tactical transition arena phase

At the tactical level, the transition arena model allows for different, sometimes competing, goals and strategies to be developed within the overall set context of the transition vision. After selecting different themes or sub-systems for which so-called target images are developed, the transition arena is split into different sub-groups (arenas of arenas). Within these sub-groups different transition-paths can be developed based on different strategies, options or agendas of the participants. While constantly attuning to the overall transition vision, the network and transition strategies will slowly evolve and keep a certain level of coherence without becoming too consensual.

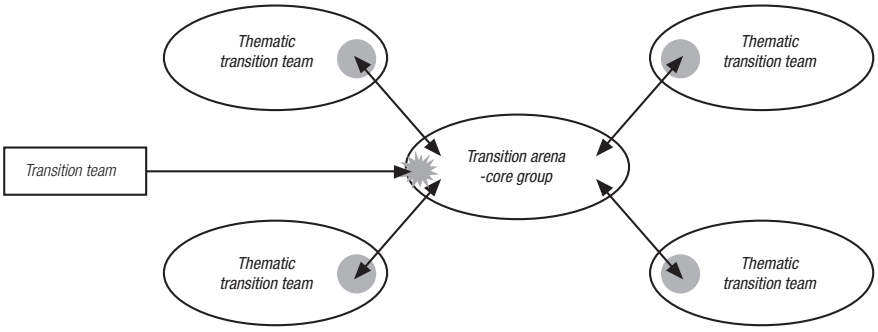


Figure 6.3 Broadening the arena from strategic to tactical level

Transition images — From the discussions about the guiding principles combined with the integrated systems analysis, different themes (sub-transitions) are selected for which transition images and transition paths are developed. These themes can be selected either on their potential to contribute to transition, on different elements of the overall vision (e.g. specific principles) or other central elements, depending on the subject and the process. Transition images can be considered as transition visions at a sub-systems level, bearing in mind that they include more concrete as well as more quantitative goals.

The development of transition images is based on translation of the shared guiding principles to sub-systems level, combined with discussions about the current state of that specific sub-system. From empirical cases, we learn that this is also the level at which innovative, yet more domain specific actors or mid-term focused actors feel comfortable. While agreeing with the previously defined overall need for transition and transition vision in the strategic transition arena, these actors have specific knowledge of and interest in specific sub-themes or sub-systems. Again, the image-development phase is iterative and consists of back-casting from the transition vision and the defined ambitions at thematic level and fore-casting of perceived current dynamics and trends (signalled in the ISA).

The basic elements that should be incorporated in the transition image are:

- **A description of the current state of the (sub-)system**
  This could be an introductory section writing in the past tense, as it were looking back from the future.
- **The sense of urgency to act**
  The introduction will indicate some barriers for change and trends and other developments that influence the development and room for change. It is also important to think through in an integrated and consistent manner which way these external trends and current barriers influence each other.
- **The ambition level**
  Here, the desired future state of the system is described, including innovations in actor configurations and institutions, technologies and infrastructure, economy and market, ecological impact and use of space.

Inspiring images are useful for mobilising social actors, since they will resemble a strategic agenda for a sector, network or other target group because these are predominantly formulated at this thematic, sub-systems level. For example, the transition image for renewable resources in the energy-transition ('Groene grondstoffen') aims for a penetration level of 30% of 'green' resources in the total energy supply in 2030 (Van Herwijnen 2003). The consequences of this ambition level in terms of market (import), consumption, production, regulation and eco-sustainability, were debated heavily within the transition arena and then communicated to the sector. The transition images could be thematic or sector specific, but they always have to encompass the institutional, economic, ecological and socio-cultural aspects associated with that specific image to ensure broad interest and make it almost impossible to promote one-sided solutions or too disciplinary approaches.

Transition paths — Transition paths are possible routes from the present towards the transition images. The members of the initial, strategic, transition arena are divided into different sub-groups on the selected themes. These arena members will be the guides for the working process in the sub-groups, also ensuring a transfer of the strategic ideas and the transition vision to the level of the sub-themes. Because of the diversity of actors also involved in the sub-groups, different strategies and ideas will be put forward and possibly different coalitions will be formed during the discussions about the transition images and their implications. The transition paths are desired development trajectories that require a specific strategy to achieve. For example, a biomass energy-supply can be achieved through the use of biomass for fuel, electricity of even in the chemical sector. These three different transition paths could all individually or combined lead to the desired transition image and each of them could comprise different specific (technological) options. Because of the uncertainties regarding the different options and the need to keep different options open and experiment with different options, multiple strategies can be explored, promoting competition but also enlarging the chances of co-evolution between pathways.

In practice, the development of transition paths is a difficult and sometimes un-transparent co-evolutionary process between the transition vision, transition images and system analysis. Step-by-step, the sub-groups will organize their work themselves, without full process-facilitation or advice by the transition management team. The transition management team is, however, still concerned with structuring the outcomes of the discussions, checking for consistency between paths and organizational support. It is very important in this phase to stimulate the self-organizational process, which requires patience and also trust in the process. Especially for those people involved in organizing the process, letting go of control can be difficult because of the uncertainty whether and how participants will follow-up on the process. However, without commitment and active involvement of the participants, the transition arena will not be effective.

The transition paths can be developed in different ways, using various methodologies ranging from scenario and envisioning exercises to modelling and road-mapping methods. There is no blueprint method, but general elements of what a transition path should incorporate are:

- **Descriptions of changes necessary to achieve the target image**
  These can be linked to the innovations described in the target image. For example, a new technological solution incorporated in the target image will mean that in the transition path this innovation is linked to other necessary innovations
- **Indication of which change should take place when**
  The innovations are situated in time and causal relations are established between different innovations. For example, an institutional or behavioural innovation or change might be necessary to enable a technological breakthrough etc.
- **Ideas on how these changes should take place and with whom**
  A more concrete idea of how the changes mentioned come about, linked to specific actors or institutions and agendas
- **Short- and mid-term goals**
  Finally, concrete goals and ambitions are formulated related to the path. A goal could be quantitative as well as qualitative: for example, a specific percentage of sustainable energy by 2015 or a new organization by 2009.

It is important to incorporate goals and objectives in the transition paths that become more concrete the closer they are to the present. The transition paths, however, also have to reflect the necessary discontinuities and behavioural and institutional changes, the uncertainties associated with the pathway and the barriers and chances for implementation. Again, the process of development of the transition paths is a participatory and goal-seeking process, where the transition images and paths can change over time. This differs from so-called 'blueprint' thinking, which operates from a fixed notion of final goals and corresponding visions.

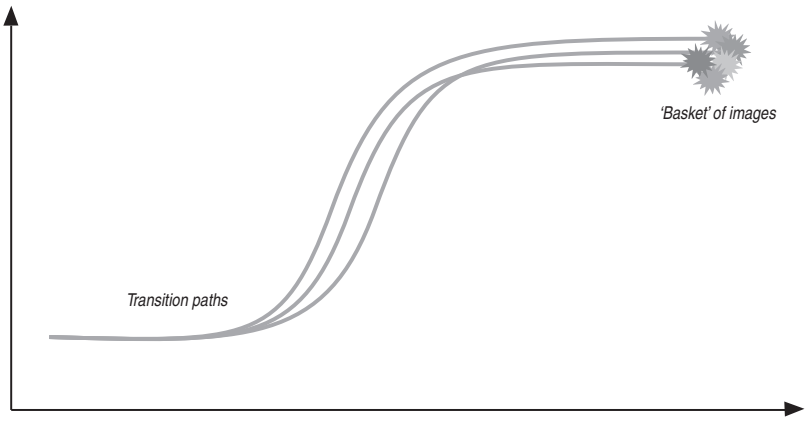


Figure 6.4 Multiple transition images and paths

- **Process goal**: creating transition network and coalitions based on strategic transition arena, developing arenas of arenas network steering and involving larger number of actors and creating broader support
- **Substance goal**: Making vision more concrete and tangible

The transition agenda — The transition agenda comprises all previous outcomes of the transition arena: the problem definition, the guiding principles and vision, the images, pathways and first ideas for projects and experiments. This is important because all arena participants integrate their own agenda into the transition arena, as a basis for the joint transition agenda. A transition agenda is actually a joint action programme for initiating or furthering transitions. It is important to set down which party is responsible for which type of activity, project or instrument to be developed or applied. The means for executing the proposed plans effectively are addressed in general terms. The monitoring of this joint action programme is important in order to guarantee that the transition agenda is complied with as closely as possible. Instruments are used here in the broad sense: from tax measures to public-private arrangements, but also new instruments, for example systemic instruments (Smits and Kuhlmann 2004). The transition agenda forms the compass for the course the transition arena participants can follow during their transition journey (Dirven et al. 2002).

The transition agenda can be considered as the main outcome of the transition arena; all actors involved need to subscribe to the agenda and it can be presented as a joint action and innovation plan for sustainable development in a specific societal system. Based on the products of the transition arena and the sub-groups, the transition management team draws up the document, which needs to be edited and graphically designed in such a way that it is presentable to a (more) general public, visually attractive and in general drawing interest and commitment to the process. The presentation of the agenda, along with an explicit presentation of the vision to the public, sector and media, can be combined with a presentation of the transition network and the involvement of high-level government and societal actors to express the sense of urgency and the need for transition management.

An insufficiently robust and ill-supported transition agenda creates a serious barrier for transition management. If the transition management team under invests in the quality of the transition agenda, many problems that will arise later in the transition process, will remain below the surface. An adequate transition agenda, however, can form a binding and mobilizing element in the transition process. The transition agenda requires a balance between structure and flexibility. Structure is needed to position the scale levels at which the issue in question plays, and to frame the issue in terms of themes and sub-themes. The coherence between the various sub-themes and scale levels is a separate and important point on the transition agenda. Structuring the transition agenda is time-consuming but pays off in the form of increased quality of the transition management process (Dirven et al. 2002). On the other hand, flexibility is needed because the transition agenda is dynamic and changes over time. In the longer term, themes, goals, means and instruments change, and so the transition agenda evolves. Practically, the transition agenda forms the long-term context for short-term policy, within which the current policy fits. If this does not match, the short-term agenda needs to be adjusted. This is an iterative, cyclical and learning process. This process is the main driver for change, the actual agenda functions mainly as communicative tool, monitoring and mobilizing instrument.

Operational transition management phase

Experiment portfolio — An experiment portfolio should include experiments of different sorts and with different foci. In the context of transition manage-

ment, the aim is to integrate existing experiments and ongoing projects into the portfolio and combine these with new transition-experiments. These transition experiments are derived from the transition visions and images. They are supposed to contribute to the sustainability goals at the systems level and should fit within the transition pathways. It is important to formulate sound criteria for the selection of experiments and to make the experiments mutually coherent. The crucial point is to measure to what extent the experiments and projects contribute to the overall system sustainability goals and to measure in what way a particular experiment reinforces another experiment. Are there specific niches for experiments that can be identified? What is the attitude of the current regime towards these niche experiments? The aim is to create a portfolio of transition experiments which reinforce each other and contribute to the sustainability objectives in significant and measurable ways.

Transition experiments are experiments with a high level of uncertainty and are focused on new combinations and insights. They are integrative and explorative by nature and try to stimulate co-evolutionary processes within or between subsystems. They need to be set in a societal context, since the question whether a specific new option or innovation could be part of a larger and desired sustainable future system is a major part of transition experiments. Transition experiments in this sense are social experiments: *does the projected solution strategy (transition path) or innovation contribute to the process of societal change in the desired direction or not?* In this sense, transition experiments differ from niche-experiments or the majority of innovation experiments, since these mainly concern technological innovation or specific solutions in a protected environment.

Transition experiments are searching and learning processes in which the results might be disappointing. When an experiment has been successful (in terms of evaluating its learning experiences and contributions to the transition challenge), it can be repeated in different contexts (broadening) and scaled up from the micro- to the meso-level (scaling up). This requires a considerable amount of time, approximately 5 to 10 years. Transition experiments are often costly and time-consuming, so it is important that, wherever possible, existing infrastructure is used for experiments and that their feasibility is continuously monitored. Efforts here focus on creating a portfolio of related transition experiments which complement and strengthen each other as much as possible, which have a contribution to the sustainability objective that can be scaled up, and which are significant and measurable.

Preferably, the transition experiments should link up with ongoing innovation projects and experiments in such a way that they complement each other. Often, many experiments and projects exist, but they are not set up and executed in a systematic manner, resulting in a lack of cohesion. Because transition experiments are often costly and time-consuming, the existing infrastructure for innovation experiments should be used as much as possible. A lack of cohesion puts constraints on the feasibility and running time of experiments. The execution of transition experiments should be done through the existing networks of arena participants to ensure the direct involvement of these forerunners within participating organizations. This approach is taken to achieve the highest level of impact and penetration possible through a process of **deepening** of knowledge and understanding, **broadening** of the scope of the project and involvement of actors and **up-scaling** or **augmenting** of the experiences and lessons.

- **Process goal**: involving actors and consumers at a concrete level, transferring transition vision and agenda
- **Substance goal**: testing assumptions, testing options

Monitoring — Transition management involves monitoring as a regular activity that is a continuous part of the process to enhance the strategic intelligence and reflexivity of these processes (Taanman et al. 2007). Transition monitoring describes and monitors the process of change at two different levels: the transition itself and the transition management process (Loorbach et al. 2003). Although the field of transition monitoring is very young, it seems that two streams are developing. The first is focused on developing standard monitoring tools that focus on the interaction between innovation activities and innovation programmes within the context of societal transitions (Ten Pierick et al. 2006). The second focuses on assessment of the governance activities undertaken and evaluates these in the context of (the theory of) transition management (Grin and Weterings 2005; Taanman et al. 2007). Of course these two approaches could be combined and these two sides of transition monitoring could be linked. In a sense, there needs to be a co-evolution between the monitoring of the transition and of transition management. Since the output of the transition management process aims to have an influence on the transition process, transition monitoring is also concerned with this interaction.

In terms of transition, transition monitoring uses the multi-level model and the system demarcation as points of departure. The ISA is considered as a first indication of the state of the system; the changes that occur in this system state are indicators for transition. At the macro-level, changes can be observed in terms of changing worldviews, trends, external events and surprises etc. At the meso-level, changes are monitored in terms of new institutions, regulations, network-development, agenda-building processes and general changes in (physical infra-) structures. At the micro-level, innovations, individual actions and development of niches are observed. This type of process monitoring at a high level of aggregation only needs to be done once every few years, although information regarding the different changes needs to be collected continuously. The monitoring of the transition itself provides the input for the transition management, where the observations and analysis of the transition are valued and interpreted.

Questions related to this part of transition monitoring are for example: Have there been any unexpected social developments or external factors that were not taken into account? Are there changes in political culture? Is there a paradigm change occurring? Did the economic and social prognoses change? Did the regime-state change in terms of flexibility or rigidity? Are there new problems in the existing system or were perceived problems solved? Are there any new regulations and institutions that enable or disable transition processes? Are there any new niches that opened up or did niches close down? Etc.

In terms of monitoring transition management, the activities at the different transition management levels are monitored. At the strategic level, development and convergence of new problem definitions and visions, new networks and new leading actors are monitored, at the tactical level, processes of coalition building, agenda-setting and agenda-change, room for new organizations and development of new formal and informal rules are observed, and at the operational level the implementation and execution of experiments and projects are

monitored. Here, both the progress with regard to the process and the substance are monitored.

Questions regarding this part of transition monitoring are for example: is there a strong consensus on an overall direction? Is there a shared sense of urgency? Did new networks and coalitions form based on shared sense of direction? Was there any progress in establishing new institutions and structures? Was there a growth in investment in the process? Were there concrete projects and experiments implemented? Did new actors become involved in the process? Were the interim objectives met? Etc.

Evaluation — Evaluation based on transition monitoring is a learning tool for transition management. Here, we primarily refer to a type of evaluation which directly relates to and is an integrated part of the transition management process. Other evaluation approaches have been developed for policy to assess the effectiveness of transition management (Spakman et al. 2002; Ros et al. 2003). Without focusing on questions related to the overall societal transition, an explicit part of the transition management cycle is the phase of evaluation of progress and reflection upon necessary changes and further action. The idea behind the evaluation of this sort based on the theoretical transition management perspective is, besides evaluating the actual activities undertaken, to reflect upon the effectiveness of these actions and through the evaluation develop more insight in and feeling for the transition management approach by the participants. Evaluation of transition management is thus also participatory by nature, but based on a (transition-) expert analysis. This approach has been used in evaluations of for example the energy-innovation programme GAVE (ICIS 2003) and the Dutch national programme for Sustainable Development NIDO (ICIS 2004)[13]. In a more general sense, the evaluation approach was also used to reflect upon the activities of the Dutch Ministries involved in transition management (Rotmans et al. 2004), but this was only a preliminary study based on an analysis of secondary materials, with the aim to provide a basis for discussion between transition researchers and policy-makers.

The process of discussing and evaluating the meaning of what has been managed or organized is crucial for the process and offers the context for reflexivity and adaptation of process and substance. This type of participatory evaluation of monitored progress is termed 'reflexive monitoring' (Grin and Weterings 2005), referring to the process in which empirical observation and analysis is explicitly linked to a strategic evaluation and valuation of these. Evaluation (or reflexive monitoring) can in this context be seen as an instrument to enable and make explicit social learning processes. The valuation and interpretation of the monitored results and progress is essential for transition management as a cyclical process: through evaluation, the transition management approach is adapted and adjusted for the next round, in terms of process design and substance. For example, when the consensus on the overall direction is perceived to be very broad, not much time and energy need to be invested in strategic envisioning activities, and more time and energy can be directed instead towards tactical and operational activities. Another example is that the evaluation will address

13 I participated in both evaluation studies.

the question whether specific options with which experiments have been set up, have led to satisfactory results and whether the experiment should be continued or augmented.

The evaluation needs to take into account process and substance at all three levels. Strategically, the overall vision and problem definition need to be evaluated against the changes in society and public and political opinion. At the tactical level, the chosen sub-themes, interim objectives and involved actors need to be evaluated. And finally at the operational level, the lessons learned in projects, the investment choices and in general the options selected need to be evaluated. In every instance, what needs to be addressed is whether the direction chosen (at the different levels) is still valid. Questions that can be asked are for example: have the goals been achieved and why? Have the involved actors complied with the agreements that were made? How do the concerned actors experience the participation process? Is it dominated by certain parties (vested interests)? Is it too consensual (too cosy), or is there too little commitment? Are there other actors who should be involved in the transition process? Are there other forms of participation that must be tried out? Explicit topic of evaluation is the learning that has taken place. What lessons and experiences have been learned from experiments? What does this imply for future policies? Monitoring and evaluation (of experience but also goals and visions) are key elements of transition management, especially because learning is a crucial (policy) goal.

Basically, evaluation is an interactive part of transition management and is used to make lessons learned explicit in order to be able to move forward with the transition management process. The basic categories of evaluation are:

1 **Systems approach**
   The key to influencing societal change is taking into account all relevant societal domains and dynamics. Transition management therefore needs to be based on an integrated systems approach, which enables developing governance activities and selecting governance-instruments based on a systemic analysis of the state of the system at hand.
2 **Arena**
   Creating a context for developing long-term governance and innovation involves bringing together innovative and visionary actors in a protected environment in which a new discourse can be developed. This new discourse involves a shared definition of a sustainability problem and a new solution of or vision on the problem.
3 **Visions and images**
   A shared vision on the future direction of development can serve as driver for change. Such a vision should then be inspiring, imaginative and participatory developed. In terms of transition management it should represent a shared definition of sustainability in a specific societal system and is not a blueprint.
4 **Agenda/pathways**
   Networks of actors are tied together by shared ambitions and goals. The transition agenda aims to bring together actors with similar goals and ambitions and helps these actors to develop a shared strategy at an abstract level. At the concrete, short-term level, these actors may not agree or explore different solutions related to the same strategy.

5 **Network**
A transition arena needs to expand into arenas of arenas in order to let the innovations and visions penetrate existing structures and thinking. The overall vision and principles developed in the transition arena should be further developed at a more concrete level in these sub-networks, so that these can serve as joint strategies.
6 **Experiments and actions**
To operationalise the ideas and strategies developed in the transition networks and in order to explore the possibilities hereof, concrete experiments and actions have to be developed and executed. The experiments should be linked to the transition agenda.
7 **Learning**
Especially at the level of the group or network, it is important to reflect on changes in beliefs, perceptions and solution strategies and whether convergence in these has been achieved.

Each transition management process will require its own evaluation process and specific points of attention and questions. The evaluation table below is taken and adapted from the GAVE-study (ICIS 2003), but the general outline can be seen as an example for the type of questions to be part of a transition management evaluation.

Organization multi-actor process and envisioning

Integrated systems analysis	Is there an integrated systems analysis and an integrated approach? Is there a systemic analysis of dynamics and developments? Were broader societal developments and other relevant societal domains taken into account? Were other policy domains taken into account? Is the choice of governance arrangements and instruments based on an integrated systems analysis?
Transition arena	Which actors were/are involved and when? Were participants selected based on competences, background and role in the process? What roles did the actors play and what did they contribute? How did the transition team function?
Long term sustainability vision	In how far is there a shared problem definition at a systems level? Was a sustainability vision developed and did this lead to involvement of a growing number of actors and convergence in thinking and acting of the actors involved? Is there an overall consensus on a sustainability vision and guiding principles? Were the problem definition and vision developed participatory? Did the vision and images create room for new routes and experiments? In how far was a transition scenario used and developed as part of the envisioning?

Transition agenda and images	Were a number of inspiring and transferable images developed? Were the uncertainties taken into account in developing the vision and images? Is there a shared and coherent transition agenda? Was it developed and communicated by the participating actors themselves? Have intermediate goals been formulated? Did the actions and experiments that were identified gain support and financing? Is there a follow-up process?
Organization and coordination transition network	Was the transition arena broadened into sub-networks linked to the central guiding vision? Did these sub-networks develop their own agendas at a sub-systems level? What went wrong and what did work out in the coalition building process? Was the involvement of participants coordinated and structured (based on analytical track)? Were there periodical renewals or changes in composition of the group?
Participation and communication	Is there a communication strategy based on target group analysis? How were vision and agenda communicated? Do outside organizations want to get involved in the process? Was there an increasing attention for the process from politics, media and larger public?
Experiments and actions	What experiments were selected, and based on what criteria? Which criteria were used to evaluate the experiments? Did the experiments contribute to more insight in transition paths and general objectives? Is there a coherent portfolio of experiments? Was there enough room for different and competing options?
Learning	Are learning goals defined and is progress monitored? Are there fundamental changes in thought and action witnessed amongst participants? Are there enough opportunities for structured evaluation? Who are involved in evaluation? How are lessons learned incorporated in an adapted process?

Table 6.4 Example of evaluation questions (based on: ICIS 2003)

6.4 Facilitating and organizing the TA – the transition management team

Organizing an envisioning process for sustainable development is essentially a learning-by-doing process and thus not predictable and to be planned in a classical manner. A transition arena as an instrument therefore shows all the characteristics of a complex system itself; non-linear development, high unpredictability, variation and selection of ideas and agendas, emergence of new visions and concepts, a co-evolutionary interaction with the external environment, crises and surprises and eventually even a regime. Facilitating and organizing the

transition arena therefore requires a combination of skills and knowledge. While the transition arena model provides structure to the process and substance, the actual work in managing the transition arena is in the details.

Ideally, a transition arena is facilitated by a team in which are represented: the initiating organization, experts in the field under study, transition management experts and process facilitators. In practice different backgrounds can be combined. This transition management team[14] is responsible for the preparation in terms of process and substance. Throughout a transition arena process the contribution, role and practice of the transition management team changes. It is very important to make clear in advance how the different members of the team will function, what their roles and responsibilities are.

	ISA	**Actor selection**	**Arena process**
Project initiator	Provide information, reports	Identify participants, select	
Transition experts	System structuring, transition analysis	Develop interview protocol, do interviews, select	Structure process and substance/ discussion
Substance experts	Relevant knowledge, data, facts	Provide participants, do interviews, select	Support process with information
Process facilitators			Facilitate meetings

Table 6.5 Active roles transition management-team in facilitating the transition arena

The TM-team brings together the various parties, is responsible for the overall communication in the transition arena, acts as intermediary in discordant situations and has an overview of all the activities in the arena. The TM-team should also ensure a balanced representation of participants as well as continuous renewal of the transition network. After some time arena participants may be replaced by new participants with other competences and practical orientations or new actors may be involved based on new questions that emerge. The TM-team guards this substitution process carefully in order not to disturb the balance in the arena.

In the implementation approach presented in this chapter, the main ingredients for any transition arena process have been described, but the majority of the energy and time of a facilitating project group needs to be invested in organization, communication, coordination and facilitation in between the arena meetings. Facilitating a transition arena is a continuous process of feeding the participants in the arena with background information, and detailed knowledge on a particular topic is necessary to enable a process of co-production of knowledge among the participants. This is of vital importance because arena experiences show that in most cases arena participants have insufficient time, lack

14 Essentially this team is the transition manager in that they select actors and prepare the transition arena process. The team manages the transition management process. However, the transition arena itself of course needs to be developed into a transition management group for the actual transition.

specific knowledge or do not have enough perspective with which to deepen their understanding of the often complex problems. Therefore they must be fed with substantive knowledge, just as the knowledge developers must be fed in turn with (tacit) knowledge from the arena participants. This substantive support concerns issues such as framing of the transition issue in time and space and in relation with other issues in other relevant fields, the development of a shared problem perception (what is the deeper problem we perceive?) and the sense of urgency that may or may not be shared. The responsibilities of the TM-team thus relate to the internal process but also to the position and relation of the arena with the outside world; both the 'regular policy arena' as well as the broader public. Since every arena-process is unique in terms of specific dynamics and context, creativity and flexibility are essential competences.

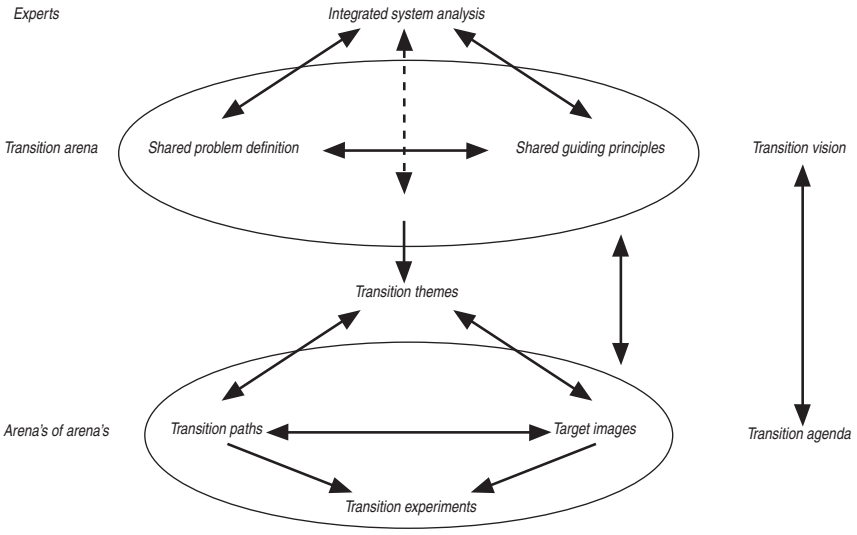


Figure 6.5 Schematic overview of transition arena process

The very schematic overview of the TA process is presented in Figure 6.5. It tries to capture the complexity and non-linearity of the TA process, but of course still does not reflect reality. It does, however, structure the different types of activities according to the type of governance and the output generated within the transition arena process. For example, the development of a shared problem definition and the guiding principles are closely linked together as well as to the evaluation of the state and/or problems of the system at hand (integrated system analysis). The development of the transition scenario in turn is partly based on the problem definition and the guiding principles but also produces new input for them. Combined, they lead to an overall vision of a desired future state, the possible trajectory of change and the conditions under which this process should develop. Similarly, the development of target images and transition paths is an iterative process, where through the development of the transition paths the

images become more concrete and vice versa. Combined with the experiments derived from the transition paths, the transition agenda can be developed as an integration of images, paths and experiments through the different themes. The transition agenda in turn feeds back into the overall vision.

6.5 Concluding remarks

In this chapter we presented a practical governance model for transition management: the transition arena. We positioned the transition arena as a systemic instrument for transition management, which is used to create space for innovators to co-create visions and pathways for sustainable development. Rather than working from within existing structures and regimes, the transition arena approach offers a way to develop a parallel 'shadow track' besides the regular policy arena in which long-term concerns, balancing of societal goals, objectives and ambitions, and problem structuring at a societal systems level can take place.

In order to facilitate this process of problem structuring and envisioning in such a way that it leads to social learning and thus changes in behaviour of participants, a methodology is presented that is generic as well as specific. It is a generic methodology in the sense that it contains elements that are applicable in any context and it is based on a governance theory that pretends to contain generic steering principles. It is also a specific methodology or model because it is only possible to implement when made context-specific. While the elements will all be part of a concrete and practical methodology, their interaction, relative importance and effect will differ.

The transition arena methodology as presented in this chapter is based as much on theory as on practical experience. It is therefore not a complete model nor is it the only possible one. However, within several practical contexts, the approach has proved to be successful and the different elements incorporated in the model have proved their respective value in an operational policy setting. The presented methodology thus provides a good framework for the organization of transition management but one ought to be careful in translation and adaptation of the methodology to a specific context. One could say that the transition arena methodology provides a basis for anyone to develop their own transition arena approach for their own specific transition problem.

Intermezzo I

The introduction of transition management in the Netherlands

The term transition is a key term of the fourth National Environmental Policy Plan (NMP4, VROM 2001) which unlike past environmental plans looked 30 years ahead into the future (except perhaps the first plan (VROM 1989) that looked 20 years ahead). It also looked different: it was a very colourful report of an unusual size with oddly-sized photos of plants, landscapes, and people from different countries spread over the pages. The title "A world and a will" (*Een wereld en een wil*), highlighted the worldwide focus and emphasized determination and wilfulness. It also did not set goals but formulated general societal ambitions, which were believed to require transitions, fundamental changes, in functional systems. The government's interest in sustainability transitions stemmed from a learning process leading to a new perspective, in which sustainability required some fundamental changes in functional systems, which in their turn required changes in policy. Problems of climate change, loss of biodiversity, overexploitation of resources, structural uncertainties and several types of risks (health risks related to the use of dangerous, non-natural substances and risks of explosion and accident) were viewed as persistent, which meant that the answers to the problems could only be found in fundamental changes in underlying systems of production and consumption. They required what was called "system innovation", a concept coming from people working on innovation issues (NRLO 1999) and adopted by Dutch policy makers (Kemp and Loorbach 2005).

A central message of the NMP4 is that policy has not been futile. At the end of the introductory chapter, it is stated that "policy matters" and that through a well-organized effort high ambitions can be reached. There are, however, according to the NMP4, a number of barriers to be taken into account when it concerns policies for sustainable development are. These are (VROM 2001 23-24):

- Unequal distribution: poverty causing irresponsible environmental management
- Short-term thinking (in policy and business)
- Fragmentation and institutional shortcomings
- Shortage of policy instruments
- Actors causing problems they subsequently ignore
- Solutions involving system changes that are surrounded with great uncertainty
- Insufficient precaution.

All barriers identified relate to the perceived unsustainability of existing societal structures and systems of governance. This causes the persistence of the problem(s). The analysis underlying the NMP4 that, in terms of long-term sustainability governance, current policies were too fragmented, in need of new instruments and were insufficiently taking into account complexity and uncertainty, is evidence that government started to think more reflexively about their own role as well as about transitions and system innovations. This reflects a change in policy thinking: policy had so far been primarily concerned with an upgrading of existing functional systems, but now the systems as a whole were seen as unsustainable and in need of structural change. This change is an example of policy learning in the context of heterogeneous (adaptive) networks (Nooteboom 2006) in which informal interaction processes drive development of new insights, knowledge and interaction patterns. System innovation and transition thus became a new focus of policy besides system improvement. This

fitted with the idea of co-optimizing economy and environment, an idea that was the topic of the government green paper "Environment and Economy" which came out in 1997 (VROM 1997). Policy became more concerned with development paths rather than with specific outcomes and shifted focus towards facilitating and stimulating transitions, which raised a number of fundamental questions regarding the possibilities of managing such processes through coordination and governance.

These changes resulted from various developments in the area of policy, sustainable development and technological innovation. Prior to the NMP4 there had been internal discussions for some years within circles of government and science on the topic of knowledge, technology and governance. A number of research programmes for innovative and sustainable technological solutions had been funded. Examples were the DTO (Sustainable technology Research) programme[15] instituted in 1993, followed by EET (Economy, Ecology, Technology)[16] in 1996. Both programmes were based on the notion of technology development as societal process and the added value of (technological) innovation for sustainable development. The underlying assumption of the programmes was that economic growth should not be unsustainable by definition but that more attention should be paid to possibly negative ecological effects. The DTO programme contributed to the revival of long-term thinking and anticipation in technology policies related to sustainable development. The DTO programme developed and introduced the so-called backcasting-scenario methodology into technology science and policy. In general, policy started to broaden the way of thinking about innovation as a purely technological process and started to pay attention to ecological and societal effects of growth and innovation.

This led for example to the establishment of the task group Technology in 1997. This task group named KETI (*Kennis and Technologische Innovatie-Knowledge and Technological Innovation*) was involved in the preparation of the NMP4 and looked not just at technology but also at knowledge and innovation and governance issues. The working group was not used as a platform for interdepartmental negotiations, but as a think tank within the government. KETI had to explore to what extent technological innovations could contribute to solve persistent environmental problems. As part of its activities, KETI commissioned a TNO study in 1997 on the topic of technological innovation in which was concluded that there are three ideal types of innovation: optimization, redesign and function innovation. It was stated by central authors Frans Vollenbroek, Rob Weterings and Maurits Butter, that function innovations were 'associated with shifts in the associated socio-economic system' and that technology offered possibilities for sustainable development when approached from the perspective of technological systems (Vollenbroek et al. 1999).These authors, who worked for different ministries, were not bound by departmental rules; they were acting more or less as free individuals. Within this working group, the term 'transitions' surfaced as a new concept to define 'development processes to change existing, undesired situations into new and desired situations' (KETI 2000).

15 http://www.dto-kov.nl/index.htm
16 www.eet.nl

Sustainable development had also been taken up by policy in the 1990s via the establishment of semi-governmental or non-governmental organizations that were made responsible for bottom-up implementation of sustainable development. Partly as a result of thinking promoted by the UN Agenda 21 (UN 1992), organizations such as the Dutch National Initiative for Sustainable Development (NIDO) were established. NIDO focused on mobilizing the sustainability potential in various sectors of society (for example water management, consumption and production, agriculture and rural areas, and urban renewal) through organizing and stimulating bottom-up processes. With the aim of realizing the 'jump' to sustainability (NIDO 1999), they formulated a four-phase approach: trend analysis and demarcation of programmes; identification of high-potential change trajectories; initiating the selected innovation ('jump')-projects; transfer of the projects (to market, policy or other actors). During their existence (1999-2004), NIDO further developed their practice and knowledge around this approach in which it was also influenced by the emerging work on transition management (which it in turn also influenced to some extent). The NIDO approach showed many similarities with the transition management approach (such as the idea of realizing structural changes, the importance of envisioning and innovation) and even presented itself in hindsight as implementing transition management 'in practice' (Loeber 2003). On comparison many elements also included in transition management as presented in this thesis and taken up in official policy were also part of the NIDO-approach, but the scale, ambition level and scientific underpinning of the NIDO approach was fundamentally different from transition management (ICIS 2004). NIDO finished in 2004, partly because of their very broad and bottom-up approach which made it difficult to claim success and identify results that could be directly contributed to NIDO. Nevertheless, organizations such as NIDO stimulated awareness of and involvement in sustainable development and helped to provide broad societal and policy support for ambitious national policies in this area. In addition, a large number of professionals experimented in the context of NIDO (and similarly in the context of KETI, DTO and EET) with different tools, instruments and approaches to implement sustainable development. Most of these professionals are still involved in this area, but now in other areas such as transition policies and new intermediary organizations (competence centre for transitions, Senternovem). They have this way contributed to the growing support and involvement in transition management.

So around 2000-2001, several long-term developments in the spheres of policy, research, civil society and business seemed to coincide and lead to the awareness that more than regular policies were needed (Bruggink 2006). In fact, the shortcomings of earlier generations of environmental policies were made explicit in light of the call for a new approach (Grin et al. 2003). The positive 'climate' that this way had evolved in policy and society formed the ideal breeding ground for the NMP4. The NMP4 itself was prepared by a team of departmental officials with various expertise and knowledge. The task of this NMP4-team was to rethink environmental policies in the context of sustainability and to develop a strategic environmental policy agenda. They explored different pathways, among which a number of studies and science-policy debates. A follow-up study to the KETI report was commissioned to explore further the idea of transitions and jumps in technological performance for decoupling environmental impacts from economic growth. This study, entitled "Transitions: can three people change the world?"

was executed by Twynstra Gudde Management, STORRM CS and Hötte Milieu Management (Twynstra Gudde 2000). First and principal author was Harry te Riele from STORRM CS, an engineer specialized in change and innovation issues. The study defined the transition concept and argued that societal change in principle could be managed when the time was right, and that one should look for levers to initiate change. These levers could be identified through causality analysis looking at causality loops. The report was based on a flux model. It did not literally say that three persons can bring about a transition but indeed hinted that under certain circumstances small groups of actors could potentially achieve large scale changes in society. The report was in a sense based on the soft systems approach and an actor approach developed by Henk Diepenmaat (Diepenmaat 1997). In their report Te Riele and Diepenmaat tried to develop a broad transition approach that was primarily analytical but also included some process elements for governance. They distinguished a number of principles (system thinking, causal analysis, levers and scenarios) as basis for dealing with transitions.

Parallel to this study, the NMP4 project team coincidentally met Jan Rotmans who had also been working on the idea of transitions, but from a perspective of societal transformation and sustainable development. NMP4 team member Silvie Warmerdam (VROM) attended a meeting of an organization of volunteers where Jan Rotmans gave a lecture about sustainable development (early 1999). Jan Rotmans was then invited to give a lecture to the NMP4 team about sustainable development, in which he referred to the concept of transitions and ideas developed at the UN (UN 1997) and his research institute ICIS (International Centre for Integrated Assessment and Sustainable Development) about this topic. Based on these first contacts, the NMP4 team and project leader Cees Moons were triggered to investigate further the possibilities of the transition concept and asked for additional presentations from Jan Rotmans specifically on transitions to be given for the whole NMP4 team and related officials. This set in motion a dynamic process of knowledge development and exchange within the NMP4 team and between Jan Rotmans and his colleague Marjolein van Asselt with whom he was, amongst others, working on transitions within ICIS. In this process a large number of presentations were given (app. 20) and discussions were held. During this period (1999) Marjolein van Asselt worked with the NMP4 team located at the Ministry of VROM for several months. During this interactive process, transitions became increasingly well defined and became an intrinsic part of thinking of the NMP4 team by the end of 1999 and beginning of 2000. Early 2000, Jan Rotmans was formally asked to write a report on transitions, in which he was asked to cooperate with René Kemp, senior researcher at MERIT.

Both had done work on transitions issues but from a different perspective. Rotmans, then professor of Integrative Assessment, had been involved in climate change assessments, dynamic system modelling, sustainable development and participatory approaches. In this context he had already used the notion of transitions in the early 1990s (Rotmans 1994). Moreover, he had been heading a research group within the RIVM (National Institute for Environmental Studies) called 'Global Dynamics and Sustainable Development' where the so-called TARGETS model was developed: an integrated model to assess climate change impacts, built to generate transitional patterns (Rotmans and De Vries 1997). After that he had worked for the United Nations on sustainable development, where

he co-authored the critical trends report (UN 1997) that analyzed several global trends from a transition perspective. As an economist, René Kemp had worked on innovation, technology and environmental policy issues. In two projects for the EU called "Technology and the Transition to Environmental Stability" and "Strategic Niche Management as a tool for Transition to a Sustainable Transport System" he had studied the issue of technological regime shifts. This built on his earlier work on technological transitions (Kemp 1994). The Maastricht team further built on work by Frank Geels (Geels and Kemp 2000; Geels 2002), and the multilevel perspective of Rip and Kemp (Rip and Kemp 1998), using examples of transitions from Geels and from Verbong (Verbong 2000).

During the first meetings between Jan Rotmans, Marjolein van Asselt and René Kemp in the context of the 'transitions'-study, Jan Rotmans came up with the concept of transition management as a governance strategy to deal with societal transitions. All three researchers found this term overly suggestive and too optimistic with respect to the possibilities for management in the context of transitions, but Van Asselt especially immediately saw the policy-potential of the idea. That transition management was not directly received with great enthusiasm is illustrated by the reaction of (energy-) scientists at one of the meetings in which Jan Rotmans and René Kemp presented their ideas. They received very direct criticism: the concept was not perceived as new; it would not work and was scientifically considered too shallow. The very direct criticism surprised the NMP4 team and in a crisis meeting, the project was almost cancelled when Jan Rotmans forced a 'stop or go' decision. Nevertheless, the NMP4 team was already enthusiastic about the ideas and felt compelled and already committed to continue with the project.

During the participatory process that unfolded, both concepts (transition and transition management) were further developed, in close cooperation and interaction with the NMP4 team. It is an example of co-production of knowledge between scientists and policy makers, in which a mutual language was developed and the transition approach was gradually internalized by the NMP4 team. In the final report, elements suggested by the ministry were integrated, such as the 'golden tips for policy'. This enabled the NMP4 team to convince the Minister of VROM, Jan Pronk, to adopt the concept as central theme for the NMP4 early 2001. In hindsight, the participatory process around the transitions and transition management study provided the basis for the NMP4 and the transition processes that started afterwards, especially the energy transition. One of the NMP4 members, Peter Aubert, an official for the Ministry of Economic Affairs was at first very critical towards the transition concept. Through the process, he became one of the most active policy officials in contributing to the development of the transition approach and would later on become one of the central figures in operationalizing transition management in the context of the energy transition.

Partly inspired by the NMP4 process, the RMNO (Advisory council for research on spatial planning, nature and the environment) organized a series of workshops and discussions about transitions with innovation experts and social, political and cultural scientists (RMNO 2000) in 1999 and 2000. The central questions were related to how the latest scientific insights about environment and policy/governance could be of use for the NMP4. Amongst the scientists involved

a consensus emerged that transitions were an interesting and promising new concept in the context of environmental policies, especially since they offered a new perspective and the possibility of broadening the scope and time horizon of environmental policies. Influenced by the new ideas from the ICIS-MERIT report, transition management was also discussed. It was argued that a form of governance based on the transitions-perspective could be used to deal with structural uncertainties. However, what transition management would exactly entail remained open and subject of further study (RMNO 2000 127) and practical experiment (VROM-raad 2001). A number of scientists involved also highly questioned the potential of actually influencing transitions and did not consider the idea of transition management to be new. However, the majority of scientists and policy officials involved in the NMP4 discussions adopted the idea of system innovations and transition to sustainability and briefly discussed the concept of transition management on the initiative of NMP4 project team members involved (RMNO 2000 127).

The direct impact of the study by Rotmans et al. that resulted from the intense interaction and participatory approach is reflected by the choice of words in the NMP4 which remained very close to the text of the ICIS-MERIT report (Kemp and Loorbach 2005). According to the NMP4: "To solve the big environmental problems we need system innovation which may take various forms. The [system] innovation may take the form of a societal transformation process that may take one generation or more. For the transformation to happen, economic, social-cultural and institutional changes are needed that reinforce each other. (…) New parties and innovative technologies play an important role. It is not a matter for the government alone but for the whole of society (…) management of transitions requires a form of process management in which uncertainty, complexity and interdependencies are addressed" (VROM 2001 107).

The NMP4 also borrowed from the ICIS-MERIT report the idea that management of transitions requires the following things:

- To deal with uncertainties, for instance through the use of scenarios.
- To keep options open and deal with fragmented policies: to stimulate knowledge and technological change, to pursue innovation and incremental improvements, to take a multi-domain view with attention to all relevant actors.
- To have a long-term orientation and to use this for short-term policies.
- To pay attention to the international aspects of change processes and find solutions on the right scale.
- A set of specific tasks for the government, namely to stimulate, mediate, engage in brokering services, create the right conditions, enforce its laws and engage in steering.

The transition approach as such brought a new energy to environmental policies, which had lost their inspirational élan during the 1990s. As environmental policy concept, 'transitions' followed 'environmental user space (milieugebruiksruimte)' and opened the way for more creative, innovative and constructive solutions and strategies for sustainability, instead of the regulatory and limiting approaches used before. In the discussions between scientists and policy-makers preceding and after the launch of the NMP4, the idea of transition management slowly became more tangible and was gradually seen as a plausible new policy approach for a number of reasons. The iterative aspects and in-built flexibil-

ity took away concerns about future control whilst maintaining an element of management or control. Moreover, it was not directly threatening to existing policy, for example Kyoto policy or innovation policy, allowing the Ministries to pursue their own agendas. It was also difficult for sceptical people to argue against an approach that focused on innovation, learning and sustainability. Finally, it offered a conceptual model for government-business cooperation in which the government could operationalize a role as facilitator in public-private partnerships.

It is therefore perhaps not surprising that of the various ministries involved in the NMP4 the Ministry of Economic Affairs became the strongest proponent of transition management. Until then, this ministry had never been among the first to adopt new environmental policies and concepts. However, because of the involvement of individuals in the NMP4 process and because of the opportunities for economic innovation and public-private cooperation, transition management became adopted as a new policy experiment. The formal reasons why the Ministry of Economic Affairs got interested in transition management are described in the ministry's policy white paper "Innovatie in Energiebeleid" (Innovation in Energy Policy) (EA 2004), but informal reasons have possibly also been decisive. Within the Ministry of EA, there was a lot of scepticism and resistance against adopting a 'VROM'-concept and the majority of EA-officials preferred liberalisation and market-based strategies over an approach in which sustainability and market conditions were important elements. Only very few officials, some of whom were involved in the NMP4 process, managed to create enough room for themselves by creating a new unit for a policy experiment with the aim of policy learning. This team Policy Renewal, was in a sense a niche within the EA-regime, where transition management for energy was experimented with and gradually developed and diffused within the ministry. Only when the energy transition process became visible and successful and concrete results were achieved, did more and more EA-officials start to see the advantages of the approach. The small transition management group that started the energy transition process continually had to ensure the continuation and effectiveness of the process and simultaneously convince their colleagues and superiors to continue support.

The first, and arguably foremost, argument they used was that they hoped to create sustainable energy business. They were hoping that the Netherlands would become a preferential location of innovative, sustainability-oriented companies. The second reason that was stated was that a sustainable energy system requires system innovations, which require a cooperative long-term approach such as transition management. Thirdly, the energy transition would help the ministry in changing its relationship with business, making it more interactive and participatory, co-aligning societal goals and business goals. As they write:

> A third reason for the transition approach is to be found in the changing relationship between market and government. Steering is no longer the province of government. This means that in the energy transition stakeholders should co-determine the directions with changes informing those directions. Policy goals should be broadened so that business, societal organization and knowledge institutes recognize their own ambitions in them. The advantage of this is that a broadly shared sense of opportunity can emerge, creating chances for new products and systems in new corners of the market (EA 2004 9).

The approach of transition management developed by Rotmans, Kemp and others as an iterative approach towards long-term change based on innovation and learning fitted the ministry's vision of how to manage the transition process. In the words of the Minister of Economic Affairs Hans Weijers in 2001: *In my opinion the government should not work from self-designed, predetermined future images that fix choices for a long time. What it should do instead is to stimulate and search for new initiatives in society that lay the basis for developments that help to go beyond existing energy policy objectives, starting from a shared concept of sustainability. The concept of transition management requires different ways of thinking and doing things on the part of government, including the Ministry of Economic Affairs. I want to play an active part in this. I have asked people of the Department to work out the concept in the coming half year* (Letter of the Minister of Economic Affairs, 2001, quoted in: (EA 2001 5)). The interest in transition management and the new role of government this required continued when EA Minister Annemarie Jorritsma, previously opposing transition management, suddenly changed her position and herself appointed the 'transition manager' for the energy transition (EA 2000; EA 2001).

Chapter 7

Transitions in Dutch waste management

7.1 Introduction

The fundamental change in Western European economies and consumption patterns after World War II led to a rapid environmental degradation of soil, water and air quality. During the last few decades, environmental policies and regulation were developed and implemented as a response to these developments. This included waste regulation and policy, which are part of a now sophisticated and efficient waste management system. Waste is a by-product of consumption and production systems. The term refers to all those products and materials that are no longer used in their primary function and need to be disposed of. During the 1960s, 1970s and 1980s waste was increasingly seen as a symbol for the negative side-effects of societal progress in economic terms and thus as unsustainability symptom: it is the result of the unsustainable organization of societal systems that does not take into account negative (environmental, economic, socio-cultural) effects in the future, on others and elsewhere. The development of environmental policies, and in this case waste management and waste policies, were targeted at these unsustainability symptoms. In that sense they can be regarded as reflexive modernization, because awareness about the negative impacts of modernization is translated in measures to reduce the negative impacts and incorporate in the process of development the concerns for the (possible) negative effects.

This chapter is concerned with the historical development trajectory that led to the present day waste management system and possibilities for future development by use of the concepts of transition and transition management. With this analysis, we hope to gain insight into the dynamics that led to the present-day system and hypothesize on possibilities for future developments. Within that context we focus specifically on the role of governance: *how did different types of governance at different levels influence the perceived transition and how could they contribute to sustainable development of the waste management system?* The research presented here was part of a larger NWO[17] funded research project 'Transitions: what drives them and how are they managed?', led by René Kemp (Researcher at Merit, Maastricht University).[18] The project aimed at deepening the understanding of transitions in general and contributing to transition management. A sub-set of research questions explored in the project was: what was the role of public authorities (in different phases)? What do the transitions tell about the proper role of public authorities and public policy in various transition stages? More specifically, what does transition management look like for waste management?

The aim of the project was to understand the shift from a local, decentralized waste management system to a centralized, liberalized and professional waste management as an outcome of an autonomous transition process (driven by for example increasing consumption, use of plastics, growing environmental awareness and emerging new technologies) in co-evolution with all sorts of govern-

17 Netherlands Organization for Scientific Research, www.nwo.nl

18 For project description, see: http://kemp.unu-merit.nl/pdf/NWO-transition-project.pdf

ance activities (formal, such as policy, regulation and institutionalization; and informal, such as networks, innovation, entrepreneurial activities). By interpreting these governance activities as transition management avant-la-lettre, the research led to a more refined and focused definition of transition management as involving those governance activities that relate to actively promoting a transition. Through a structuring of these governance activities on different levels, the analysis provided argumentation and illustration of the multi-level transition management framework.

The research project was based on a literature and policy document study. This provided the basis for analysis of institutional, regulatory and behavioural changes in waste management. Data from the Dutch bureau for statistics (CBS) was used to analyze quantitative changes in waste management. Remarkably only since 1985 reliable figures related to waste quantities and management practices have been collected. This complicated the analysis of the period before 1985 where only rough data is available, in itself an indicator for the change in organization and thinking about waste management. The literature, document and data analysis was complemented with a series of interviews with key figures from the waste management system. For example the directors of the AOO (Mr. Daemen and Mr. Huisman), high level policy officials from the environmental ministry and policy (a.o. Mr. Lansink), researchers for long time involved in waste management (a.o. Mr. De Bree, Mr. Eberg), NGO-officials (Mr. Jager, SNM) and business actors involved in the issue (Mr. De Jonge, De Jonge Milieuadvies). The interviews were used to validate the long-term transition analysis as well as to complement it with personal narratives and details. The transition analysis was refined by an institutional analysis (Parto 2006) and a causality analysis where different events and changes during the waste transition were assessed in terms of interdependency, influence and feedback (Geels 2005). In a final workshop, the different actors were brought together to discuss the analysis, future expectations and strategies.

Through the historical analysis and debates about the analysis with practitioners from the waste management field, it became clear that a historical transition analysis can be an instrument for co-construction of a shared historical narrative and systemic understanding of a present-day situation. Without broad consensus on details, explanations or causes, it proved to be worthwhile to invest in such a shared point of departure because it makes fundamental reflection upon the current state of the system and hence development of a shared orientation for the future possible. It illustrated that problem structuring on the level of a societal system (strategic transition management) is not a matter of details but of interpreting long-term patterns, short term dynamics and causal relationships. The possible role of such a historical transition (management) analysis is illustrated in this chapter by a project of the Flemish Waste management agency OVAM.[19] In this project, the historical analysis of the Dutch case was translated to the Flemish case and then used as a basis for a position paper on the future of waste management. Although the Flemish and Dutch waste management have evolved differently over the last four decades, there are a number of striking similarities, such as the driving factors, the development pathways and their

19 www.ovam.be

current system state. Hypothetically, they could share the same conditions and characteristics for a new transition in waste management.

This chapter is structured in three parts. Section 7.2 contains the narrative of the Dutch waste transition. In paragraph 7.3, we reflect upon the influence of the different types of governance and different kinds of social developments that drove the transition process towards its present state. These are the insights that are integrated in the governance framework presented in Chapter 5. As an example we shortly describe the use and goal of historical transition analysis for transition management by means of the OVAM project mentioned above. Then we theorize upon future challenges for waste management based on the transition analysis in 7.4. Finally we draw conclusions on what our transition analysis means for past and future of waste management and what it means for the transition management theory and framework.

7.2 From Waste Disposal to Waste Management

Around 150 years ago recycling and re-use were common practice in the Netherlands. Enterprising individuals collected production and consumption by-products and wastes such as glass, metals, old fabrics, and certain types of organic waste ('aardappelschillen') to be used in different applications. For example, metal and fabric wastes were re-used while different types of organic waste served as fertilizer or as feeding material for farmed animals. The first permit to collect waste is said to have been issued in 1847 to a Dr. Sarphati, who was authorized to collect household waste (Tellegen 1996). In addition, a new practice of using organic materials and human waste (faeces) in fertilization processes was slowly emerging. This relatively stable and effective, small-scale private sector was significantly put under pressure at the end of the 19th century because of rapid industrialization and the economic and social changes associated with it. The first infrastructural works emerged in this era, when sidewalks were constructed, clean water provision secured and the first sewer-systems developed in inner cities (Van Melle 2003).

In the beginning of the 20th century, a strong tendency towards living in urban areas necessitated the development of large-scale sewage-systems and installation of toilets in houses. The introduction of artificial fertilizer weakened the demand for organic fertilizer, resulting in an enormous decrease in the use of organic (compost) waste. The collection of organic waste for economic gain became progressively less attractive. In parallel, the process of economic growth and the manufacturing of more and more consumable products created new waste streams resulting in a substantial increase in the total amount of waste generated. A direct outcome of these developments was the withdrawal by private entrepreneurs from collecting waste since there was no direct economic benefit. The government was compelled to become involved in the business of waste collection, treatment, and disposal. It may be suggested that these developments constitute a transition from a diversified, decentralized market for waste to a more centralized and uniform public waste-collection system.

Disposal of waste through landfilling seems to have been the method of choice for the government at that time. The location of landfill sites was as contentious then as it is now. In the beginning of the 20th century for example, there

were protests by local residents against landfilling the Naardermeer near Amsterdam (Wolsink 1996). These protests led to the formation of the Vereniging tot Behoud van Natuurmonumenten (Society for the Preservation of Nature) in 1905 and the designation of the Naardermeer as the first nature reserve in the Netherlands. This combination of a shortage of landfilling space and the social pressure to handle waste differently, led to an increase in the amounts of waste incinerated. In 1912, the first incineration plant was opened in Rotterdam, while Leiden and Amsterdam followed in 1914 and 1918, respectively. The small incinerator built in The Hague in 1918 was unique in generating electricity. The shortage of landfilling space in the immediate vicinity of the areas where the waste was being generated led to the emergence of transportation operators such as the Vuilafvoer Maatschappij (Waste-removal association, VAM) whose role was to transport household wastes to other areas for use as fertilizer, disposal or incineration. For example, the VAM transported household waste to the province of Drenthe, where it was used to fertilize the land. Disposal techniques included dumping of waste in swamps (sometimes to reclaim land). A notorious example of this practice is the Vogelmeerpolder, where companies dumped their (toxic) wastes freely until the mid '90s. Even then, the Council of State, the highest judicial institution in the Netherlands, concluded that companies were not responsible for the pollution in the Vogelmeerpolder.

During the 1920s and 1930s the decentralized and labour intensive waste system was professionalized through introduction of new technologies and methods. Waste collection was increasingly supported by new technologies and practices. For example by the beginning of 1930s closed waste-bins replaced the crates and boxes people had used to collect waste before. Also, garbage trucks and waste collection ships were introduced to professionalize the collection. This led to specialization and new waste-related professions in organization and management but also in handling specific waste flows (fabrics, scrap metal, organic waste). The municipal waste collection agencies profited from these developments and grew into bureaucratic organizations with a position that was increasingly seen as socially important instead of 'filthy'. This was for example illustrated by the grand celebration of the 50th birthday of Amsterdam's municipal waste-collection agency in 1927 (Vis 1998). Waste management had established itself as an important and professionalized sector, it created business and jobs and provided a valued societal function. This system would remain in place until well into the 1960s, only marginally changing because of new technologies and slowly increasing waste quantities.

In the 1960s the economic progress led to an enormous increase in general consumption and therefore in the production of waste. This increase in waste was complicated by an increase in use of synthetics (plastics), most notably in packaging materials and disposable products (from batteries to cans) and the increase in use of chemical and toxic substances. Although these waste streams were not suitable for composting, the dominant practice in "managing" them was still landfilling. In the beginning of the 1970s the environmental impacts of landfilling became a matter of public interest. This interest was compounded by widespread concern about the negative impacts of consumerism, reflected in the Club of Rome report in 1972, which had a large impact in the Netherlands, and the oil crisis in 1973. Combined with a growing dissatisfaction with waste and wasteful consumption, concerns were raised about how waste was being man-

aged. The combined effect of these concurrent developments appears to have determined the evolution trajectory over the next 30 years.

Predevelopment

Western societies experienced dramatic changes in the post-war period of the 1950s and 1960s. Not only was there economic growth, societal changes also involved the first phases of European integration, democratisation, the rise of consumerism and individualism. In the 1960s, the macro-landscape thus started to change dramatically, leading to the first warnings against the effects of this growth in the form of environmental impacts. Economic progress led to an enormous increase in general production and consumption and therefore the production of waste. The increase in waste was caused by an increase in use of plastics, most notably in packaging materials, and the production of disposable products. Nevertheless, a relatively stable, locally organized system of waste management was still present. There was no need for strong regulation or a real incentive for integration or coordination of the sector, since the waste management system was effective at that time, although increasingly under pressure because of increase in waste-production.

One of the major challenges for government agencies dealing with waste at that time was the shortage of landfilling space and scarcity of sites to build incineration plants. The mounting volumes of waste created a niche for private companies to transport large amounts of waste to Belgium, where landfilling space was still plentiful and public opinion about waste was significantly less negative than in the Netherlands. The total volume of household waste continued to rise from over 3 million kilograms in 1971 to over 4 million kilograms in 1980. Notable innovations during this period included small-scale recycling of glass and fabrics as well as the re-use of materials through second-hand stores.

At the same time, the Dutch government introduced regulation to reduce waste volumes and took innovative steps, based on analyzing waste composition, to eliminate or reduce the volume of certain waste streams. A key outcome of these developments was the "law on wastes" in 1979 (*Afvalstoffenwet*), which defined the structure and the procedures for the management of waste in the production and composition of products, the use of packaging materials, treatment and disposal of waste, and the separated waste collection system. In general, the government in the seventies tried both to limit the total amount of waste produced and to take innovative steps going beyond landfilling in the management of waste. Another innovation in this period was a method to rank different types of waste management. The "Lansink's Ladder" was initiated by a motion and passed in Parliament in 1979, and became law in 1986.[20] The hierarchy of waste management according to Lansink's Ladder went from prevention, through re-use (of products), recycling (of materials), incineration (with energy-production) to landfilling as the last option. The need for the prevention of waste was considered to be necessary as well as obvious. These developments also led to the formulation of the 'afvalstoffenwet' (waste-substances act) which became law

20 This section is partly based on: Lansink, A. (2004). *The Waste Hierarchy*. Workshop Waste Management, AOO.

in 1979 and which opened the way for more waste-flow specific regulations and measures (Tellegen 1996).

Arguably the evolution of Lasink's Ladder is intimately related to the societal desire to deal with waste appropriately and to prevent adverse environmental impacts. Pressed by the government and societal demand, by the end of the 1970s waste handlers reluctantly but increasingly had accepted the separated-waste collection system. The uncertainties associated with developing standard recycling or separated-waste collection systems, significantly weakened the willingness of businesses and organizations to start participation in managing waste. In addition, a direct link existed between incineration and landfilling capacities and earnings on the one hand and the amounts of waste available on the other hand. This link was a crucial factor in the decision making of the main actors. It is reasonable to suggest, given the uncertainties of the time, that it was because of the pressure exercised by the government on waste management operators, that the operators began to take an active interest in developing or adopting new practices. Provincial borders were closed for waste transports and operators were given the exclusive right and obligation to collect waste in a certain region. Operators were guaranteed necessary supply (*processing certainty*) and transporters had a guaranteed demand. The activities were organized as municipal service, controlled by local politicians formally in control, responsible for funding.

Already in the 1970s local initiatives emerged around recycling and re-use of waste. Through second-hand shops an alternative circuit emerged and recycling and re-use, for example of glass, paper, clothes and metals, became more and more common practice. These practices were supported by technological innovations in (separate) waste collection but also by government and NGO campaigns raising awareness. The initial reluctance within the industry to adopt the separated-waste system came from the municipal waste-collection services that literally had to change their routines and standard practices. Other actors such as NGOs and private businesses initiated new activities such as the collection of paper, glass and other recyclable materials. The systematic collection of the bulk of recyclable waste and organic materials would only become institutionalized by the 1990s (Parto 2003). This institutionalization process is likely to have benefited from the fact that waste collection had to be performed by the municipal waste collection services.

During the early 1980s there were serious concerns about the devastating effects of acid rain and deforestation. Also evident in the 1980s was a shift of focus from welfare to well-being issues, including a healthy environment. The concern about environmental well-being was in part fuelled by revelations that old landfill sites such as the Vogelmeerpolder near Amsterdam and one near Lekkerkerk were leaking, causing pollution and environmental damage. The pollution was in part a product of landfilling practices between 1900 and 1960, though the main damage seems to have taken place between 1960 and 1970 when thousands of barrels of toxic waste were illegally dumped on former waste sites. New building plans revealed the toxicity in Lekkerkerk and citizen groups strongly protested against the public health effects of building residential housing on former landfill sites (Wolsink 1996). There was significant political and community resistance to the construction of new landfills and incineration plants and waste scandals were frequent news items. Lansink's ladder gained popularity and became generally accepted. As a result, incineration was being promoted by the government agen-

cies as the preferred option over landfilling. This led to an increase of investments in incineration plants throughout the 1980s. In 1989, public concern was raised over the emissions of incineration plants, when high concentrations of dioxin were found in consumption milk by the RIVM. This immediately increased the pressure on the government to increase measures on emission reduction.

As a result of the developments in the 1970s and 1980s, there was an increased societal and political sense of urgency on environmental issues and the issue of waste management. The Ministry for the Environment (VROM), which would set the course for development and execution of environmental policies, and the RIVM, a national institute for monitoring and evaluating environmental policies, were established during this period. These institutions were pressured by the public as well as by the persistency of the problem to more effective waste management, and to initiate programmes for cleaning up local environmental pollution, pollution prevention, re-use, and recycling. The first debates on an incineration infrastructure, organizational structures and market development followed.

Because of this, a number of high-level policy-makers (a.o. Ed Nijpels, Hans Alders) realized that systematic management of waste required long-term, integrated policies instead of fragmented, locally organized management. The waste management system was reviewed by the Landelijke Coördinatie Commissie Afvalbeleid (Commissie Welschen) in 1989 who concluded that: "the current organization is fragmented, dispersed and small scale". It argued for the creation of a nationally oriented organization for disposal, for the management of overall waste volumes and for keeping disposal costs under control. For incineration, but also for organizing waste management from the cradle to the grave (chain-management), four waste regions (encompassing several provinces) were envisaged, each with 3 to 4 million inhabitants.

This change of perception among the policy makers underpins the development of NMP1, which formulated long term (15+ years) environmental targets with regard to waste. Central to policy thinking was the "waste hierarchy" proposed in the parliamentary motion of Ad Lansink in 1979. The motion became law in 1986 and was an important cognitive institution (Parto 2003). From the late 70s on, waste was increasingly seen as "a waste of money" in policy. Business in turn started to investigate ways to reduce waste as part of its economic ánd environmental policy.

The perception of incineration as an environmentally sound method of waste disposal began to change dramatically. In retrospect, the dioxin scandal could have been prevented had there been proper regulation or policy on emissions. In response to the dioxin scandal the government devised ambitious plans, besides NMP1, on pollution prevention and re-use to minimize waste. During the '70s and '80s, a change in thinking about waste was thus accompanied by a new strategy to manage waste. This strategy was primarily focused on reducing the negative effects of waste on the environment through emissions reduction, re-use (through energy-recovery) and better collection.[21]

---

21 One of the hot issues in the eighties was waste in the public space ('zwerfvuil'), a topic that NGOs like Greenpeace embraced because of its communicative power. For example, Greenpeace had a campaign in which they showed huge piles of household waste (milk cartons) and used it as a very powerful symbol of the wastefulness of the modern consumption society.

Take Off

At the end of the '80s, the Dutch waste management system found itself in a state of crisis. The crisis was fuelled by crises like the discoveries of polluted sites and the public concerns, but also by the stress on the insufficient waste management capacity. The practice of landfilling was perceived as unsustainable, and after the dioxin scandal, incineration was also under pressure. The practice of (illegally) transporting waste became increasingly profitable, so that in a sense the problem was exported instead of managed. A complicating factor was the closure of landfilling sites such as 'De Does' near Leiden, which led to an immediate shortage in landfilling capacity. Furthermore, still increasing waste quantities could no longer be handled regionally, so new institutional as well as regulatory frameworks were inevitable. Opposed to the negative pressures on the regime, the seeds of change were also present in the form of alternative (recycling-) practices, novel technologies (ranging from emission reduction to waste-collection technologies), political and private shared goals and agendas and a general national and European environmental regulatory framework. Between 1989 and 1992, these dynamic developments converged and materialized in Lansink's Ladder, NMP1, the establishment of the AOO[22] and the VVAV.[23] In a sense, the final decisions were made regarding the outlines of the future waste management system: how waste was to be managed (what options and priorities) as well as the way in which this should be organized (what institutions and actors).

Acceleration

During the 1990s, the changes set in motion during the 1970s and 1980s accelerated. Institutional organization, market structure, physical infrastructure, individual practices and general culture were transformed in a decade. In a sense the process of change accelerated based on the rough direction which was developed previously. The co-evolutionary process was only directed to a certain extent, by the conditions for waste management developed beforehand and by new, re-active policies developed during this period. The institutional organization of the sector was increasingly centralized through establishment of the AOO, which was to coordinate policies between the Ministry (VROM), the provinces (IPO) and the municipalities (VNG). The AOO became the primary governmental actor in the waste management field regarding the implementation of policies for modernization of the system (Van Baren 2001). Although they also did have a say in formulation of policies and political priorities, it was the Ministry of the Environment that developed the rough strategies and formulated regulation. Specific targets for waste management were agreed upon by means of negotiation between the ministry and AOO.

Not unimportantly, the governmental actors (especially the municipalities that until then resisted giving up authority) were willing to cooperate since the waste management as a whole was in crisis because of capacity problems in combination with dioxin and landfilling crises. The same sense of urgency, perhaps even increased by the rapid governmental reorganization, made the

22 Afval Overleg Orgaan, Waste Consultation Agency, www.aoo.nl

23 Vereninging van Afvalbedrijven, Association of Waste Companies, www.verenigingafvalbedrijven.nl

sector increase their internal cooperation and organization. The establishment of the VVAV as a national representative body was a major step in the nationalization of the waste management system. It not only enabled consensus building on a national level, streamlining of waste management policies and the development and implementation of a national strategy, it also led to internal changes in the waste sector: clustering of companies, mergers and acquisitions and thus to fewer but larger waste management companies. Within a few years, the decentralized and fragmented institutional structure was replaced by a large scale, centralized structure. Because of these developments, several voluntary agreements (*convenanten*) could be reached between industries and government (A00), such as the Packaging Convenant and the removal contribution for consumers. Regulatory, new initiatives were and are taken to introduce differentiated tariffs (Diftar) to stimulate recovery and re-use. The next generation of National Environmental Policy Plans further stimulated this progress and the development of a waste-market, in which waste was increasingly perceived as money.

This provided the institutional context, alongside the general environmental legislation (like the law on environmental protection (*wet milieubeheer*, passed in 1994)) in which governmental bodies, industry and consumers cooperatively developed the new waste management system. The coordinated and centralized approach was further supported by the Committee on the Future Organization of Waste Policy (CTOA), which produced an influential report on the organizational structure of waste management in 1994 (CTOA 1996). They argued not only for more coherent institutional organization, but also for streamlining of waste policy and regulation in the form of one over-arching waste-policy plan. Until then hazardous and non-hazardous waste had been treated separately. The drive behind the rapid structural changes at the level of technological infrastructures, institutions and regulation, markets and industry, was clearly to achieve more efficiency and economic benefit.

In this process, waste-prevention was not realized outside the industry where large scale-prevention was relatively easy and economically interesting. In households, waste separation was introduced in 1994 and this rapidly led to new technological infrastructures, and new practices of waste separation and recycling. Although this raised awareness regarding waste, it became an incentive to deal more efficiently with waste rather than to a realization that the amounts of waste produced were too high. In a sense, the development of a diversified waste management system co-evolved with the development of diversified waste practices in households, so that nowadays almost all waste-flows are individually treated and utilized to their maximum potential. Waste management companies benefit from this system because waste in a sense is their economic resource, and because of this they will not be first to promote prevention.

Major progress was being made during the 1990s in developing the incineration infrastructure and in the introduction of separate waste collection and waste separation in households and industry. New incineration technologies were slowly introduced, reducing emissions (through placing filters) and optimising energy-recovery. By the end of the '90s, this resulted in a highly developed, professional waste management infrastructure, a remarkable shift from landfilling to incineration and re-use (see Figure 7.1) and institutionalized recycling practices in households. Since 1985 incineration has grown from approximately 5 to 10%

and landfill fell from 35% to approximately 10% of the total waste supply.[24] Real reduction of waste output, however, was only realized by industry, for whom prevention and reduction of material use was economically beneficial, which still led to an overall growth of waste being produced. Despite all the recycling initiatives, the total amount of waste was steadily increasing, from 4 million to over 4,5 million kilograms between 1980 and 1990.

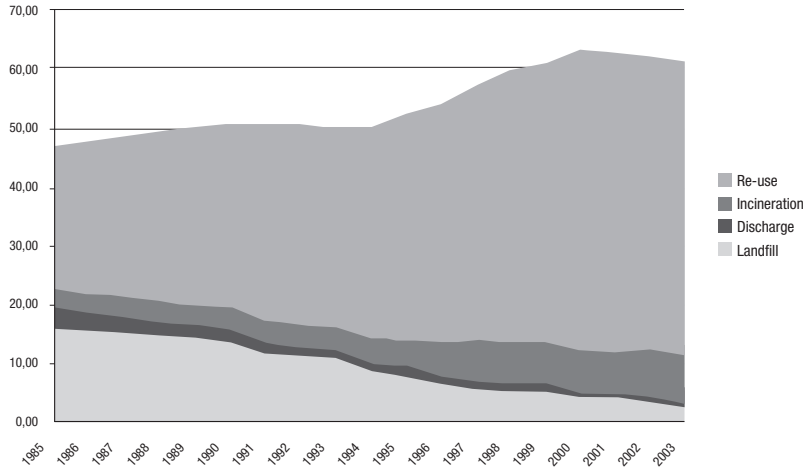


Figure 7.1 Changes in waste management 1985-2003

Besides the national strategy and focus on incineration as preferred option over landfilling, the new regime was based on the idea that waste should be treated as valuable economic good. This led to the development of a waste market with its own economic regulation and privatized waste management companies. Also, from a cost-efficiency point of view, re-use and reduction of waste was stimulated, leading to a number of packaging convenants devised to minimize packaging by suppliers of packaged goods and professionalization of recycling. "Producer responsibility" was introduced to minimize consumer generated waste. Environmental protection became more institutionalized, as did practices such as separating organic from non-organic waste and recycling glass and paper.

The system stabilizes: a transition?

Today 85-90 percent of the total waste in the Netherlands is diverted from landfills through recycling, re-use, and incineration.[25] Households and firms appear to have internalized certain (constituted) behaviour such as care for the environment, partly by obligation because of an effective system of sanctions. An exami-

24 Accurate figures on waste management have only been produced since 1985, and more often since AOOs establishment early nineties.

25 www.aoo.nl

nation of the Dutch waste subsystem since the late 1960s reveals that significant events and changes occurred, particularly in the 1970s, which catalyzed a series of institutionalization processes to transform the subsystem significantly. The increase in amounts of waste as well as the problems related to the disposal of waste, led to regulatory and structural changes during the 1980s, especially the legal codification of Lansink's Ladder in the Environmental Management Act. This was followed by further regulation and structural change in the early 1990s, including the establishment of the AOO. Regulations on emissions and landfilling were accompanied by the establishment of new market based representative organizations such as the 'Vereniging van Afval Verwerkers' (VVAV, Organization of waste management companies, 1991) and the 'Vereniging Aanbieders Oud Papier' (VAOP, Organization of paper recycling, 1992). Also, a general law on environmental protection was passed in 1994 (wet milieubeheer, incorporating Chemical Wastes Act [1976] and the former Waste Substances Act [1977]).

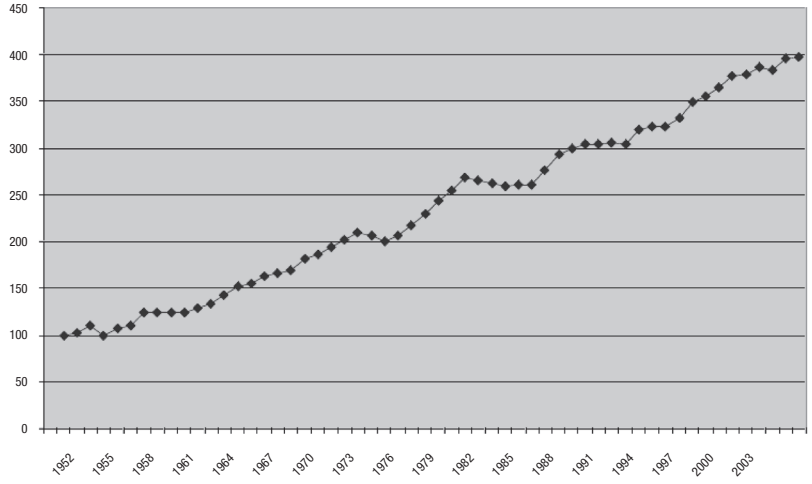


Figure 7.2 Household waste kg per citizen, 1950-2003 (Source: CBS, CBS/MNC/jul06/0144)

Despite these efforts it seems that, although an increasingly larger part of the waste generated was put to good use, the total amount of waste generated has steadily increased and is still increasing. This is illustrated by the growth in household waste throughout the period 1950-2006 (see Figure 7.2), rising from approximately 100 kilograms in the early 1950s to close to 400 kilograms in 2006. Often linked to economic growth, the increase in production of waste is explained by increase of consumption. This alone was not an immediate reason for transition, but combined with the fundamental changes in composition of waste, a structurally different system was needed. In the 1950s, 86% of household waste was either organic or paper material; 5% was composed of metals, glass and textile, and only 9% consisted of other products, predominantly coal ashes. In 2004, 61% was organic and paper, 19 % plastics, 10% metals, glass and

textile and 12 % other (wood, leather, rubber, ceramics) (MNP 2005). Combined with a doubling of the population and a sharp increase in industrial activities (besides other new or strongly increasing sources of waste such as demolition, chemical industry and agriculture) a combination of factors thus 'caused' the transition of waste management. This transition impacted the whole system: the physical infrastructures and technologies, the regulatory and institutional context, the culture and practices and the market.

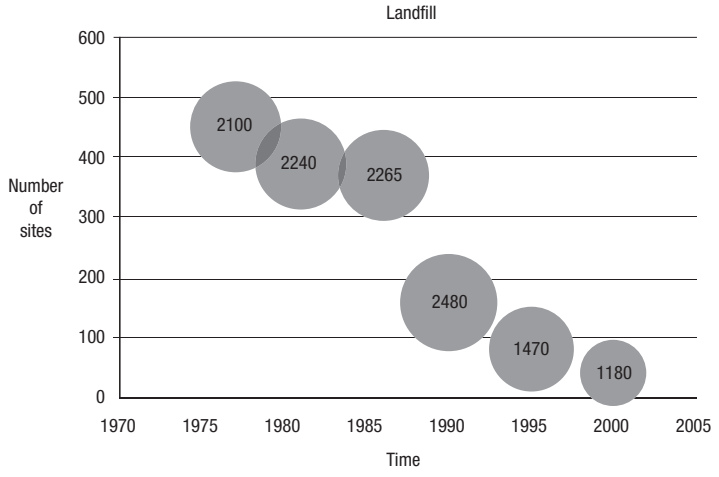


Figure 7.3 Development in number of landfilling sites and amount of waste handled in Mton

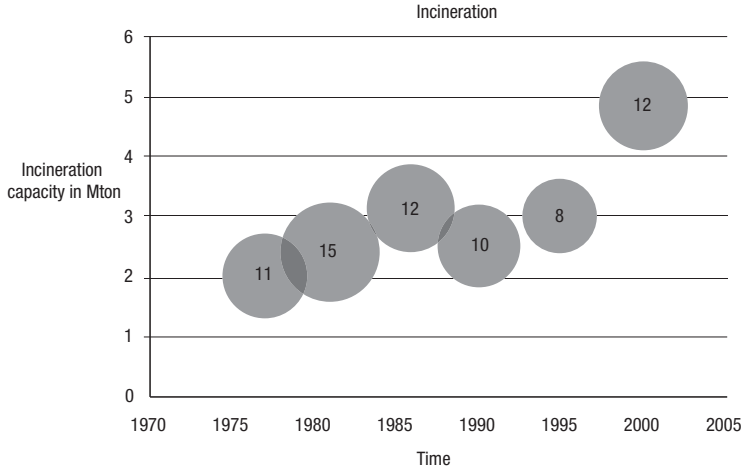


Figure 7.4 Number of incineration plants and capacity

The physical infrastructure of waste management changed dramatically: from decentralized small-scale uncontrolled landfilling and incineration to centralized, large-scale controlled incineration and landfilling (see Figure 7.3 and 7.4). In the 1977-2000 period, the number of landfill sites fell from 450 in 1977 to 34 in 2000 thanks to the differentiated waste-handling approach and targeted policies (such as the packaging covenants), the ban of 32 waste stream for landfilling, and steadily increasing costs for landfilling. These created an incentive to move up on the waste hierarchy. The amount of waste being landfilled fell from 14 Mton in 1990 to 5 Mton in 2002, a reduction of 9 Mton. Today all landfills have advanced systems of soil protection and systems of methane extraction. In the same period, the capacity of incineration increased gradually, from 2.2 Mton in 1980 to 4.9 Mton in 2000. Between 1995 and 2000, incineration capacity increased with 2 Mton. Recycling increased between 1985 and 2000 from 23.5 Mton to 45.3 Mton, almost a doubling. By 2001, disposal of production wastes through effluent discharge had been effectively eliminated, the rate of growth for landfilled waste had slowed down, and incineration and re-use / recycling rates had increased despite a general increase in the total volume of waste generated (A00 2002). Regardless of the controversies around the issue of incineration and the ever-increasing total volume of waste, policies to steer waste away from landfill sites have been highly successful.

It seems that the current infrastructure is sufficient for handling current waste-quantities. Between 2000 and 2005, the growth in household waste production stagnated, partly due to the stagnating economy. We also see stabilization or at least a temporary standstill in terms of organization level, market development, policy and regulation and in terms of individual practices. Looking at the fundamental structural changes that occurred and the temporary new dynamic equilibrium reached, Dutch waste management has undergone a major transition from waste disposal to waste management. Currently, developments seem to have stabilized, although of course a highly dynamic waste market in an international context is by definition always changing. From a transitions perspective, however, a new dynamic equilibrium has been reached at the systems level and a new regime has been established. This new regime consists of a professionalized waste market, including a small number of giant waste corporations that operate internationally. This has led to an increased efficiency in managing and re-using waste, for example energy-recovery through incineration. The waste-market is regulated nationally (although international, EU-regulations are becoming more important over time) by a central institution, which coordinates all governmental bodies involved. Consumers and citizens have changed their behaviour and developed new habits and routines. So there seems to be a balance between high levels of waste production, high degree of separation, highly professional waste management and an efficient and regulated national waste-market. In conclusion, the analysis shows the changes that occurred in waste management can be interpreted as a transition. However, it is questionable to what extent this transition led to a more sustainable waste management system. This obviously is a normative issue to which we will come back more extensively in paragraph 7.4.

7.3 Was this transition managed and if so, how?

The transition to a system of recycling and increased incineration with controlled landfilling as a last resort option is often viewed as the result of policy and as a successful and finished process (Schut 2002). Such a view, although not wrong in itself, overlooks that the policy was itself the result of various changes: the growing volumes of waste, the waste scandals in the '80s and early '90s, and changes in beliefs (such as the belief that waste is "a waste of resources" and the belief that landfilling should be done in a hygienic manner and only be used as a last resort option) in a period in which environmental awareness was growing. The waste scandals helped to close down old incinerators and build better ones. Various waste acts laid the basis for policy, and the AOO, created in 1990, brought together the three layers of government (local, provincial and central) to work together in a policy network with no clear legal status under an independent chairman. This led, in combination with the development of a national waste-market, to mergers and the establishment of representative organizations. The transition in waste management is thus the result of policies as much as of external economic, sociocultural and environmental changes (Eberg 1997; Eberg et al. 1998).

The role of the Dutch government in this process was that of facilitator and partner and not that of initiator and pioneer (Eberg 1997). Obviously specific policy plans and governmental bodies have had their influence, but the transition was never controlled or planned top-down as such. There is, however, a strong influence of all sorts of activities from involved actors on the development trajectory of this transition. The question asked here is to what extent different forms of governance impacted the transition and how. In hindsight, three different types of governance activities seem to have played an important role in the transition: related to the sense of urgency and the necessity to act, related to regulatory and institutional structures and related to implementation and technology. These three different types can be defined as strategic, tactical and operational transition management.

At an abstract (strategic transition management) level, opinion makers, politicians and environmental NGOs signalled the problem and created a sense of urgency around the issue of waste management during the 1970s. There was no broad public awareness or concern around the issue, although environmental concerns in general were growing and the first signs of a change in culture were present. In this context, the outlines of environmental policy were formulated, which created the conditions for a process of formulating national environmental policy plans, environmental regulation and the establishment of formal institutions such as the Ministry for the Environment. This process was heavily influenced by societal movements (environmental NGOs, NIMBY) and public concerns over the environment and (toxic) waste (Van Baren 2001). In a sense, environmental degradation became widely perceived as a persistent societal problem and waste was increasingly seen as a central environmental issue. This process of problem structuring at an abstract level resulted in debates on the future of the environment and the role of government. In this context there was an emerging consensus that waste management should be used both to combat the growing production of waste and to develop more efficient waste management systems. 'Lansink's Ladder' was a materialization of this awareness, and prevention became a priority for policy, at least on paper.

A number of (tactical transition management) processes were set in motion because of the developments at the strategic level. A number of regulations and laws were accepted by Parliament that led to new practices and new actors and roles. Different interest groups (for example the foundations for Nature and the Environment (SNM) and for Packaging and the Environment (SVM), the National Environmental Consultation (LMO)) organized themselves to deal effectively with the new field of environmental policies and regulation. This in turn created new professions and new routines, initially on the environmental issue in general (e.g. environmental management and consultancy, environmental experts) and later on for specific environmental themes. At an operational (transition management) level, these changes were accompanied and stimulated by a number of innovations and projects in the area of recycling, incineration (mainly development of new technologies) and reorganization of landfilling sites. Local practices started to change here and there, but until 1980 there were no significant breakthroughs.

During the 1980s the social changes as well as the different governance activities were reinforced by the waste-related environmental crises. This opened up more room for ambitious policies (NMP1) and created acceptance for sustainable development. Policies had adopted the notions of environmental policies and sustainability, Lansink's Ladder was turned into law and the first specific targets on recycling and incineration were agreed upon. Through public awareness campaigns and recycling experiments, public participation grew and new initiatives and practices emerged. For example experiments were established with new separated waste collection and management. In education, waste and the environment were introduced as topics, contributing to the growing awareness. The NMP1, published in 1989, marked the end of a process of problem structuring and debate on long term ambitions and goals at a societal level. Immediate crises with toxic waste and old landfilling sites created a sudden momentum for environmental and waste policies, but the rough framework for a future waste management system had already been formulated.

This framework included, although not explicitly formulated at that time, the waste hierarchy, preference for a national system, a focus on efficiency and optimization, liberalization as philosophy combined with strict regulation and finally an efficient governmental organization. This provided the long-term orientation that can be seen as a strategic transition vision. The changes that occurred during the 1990s in part realized these ambitions, though by no means fully. However, a fundamental transformation took place during the 1990s in waste policy, waste market and waste practices. There was a very specific management context in which these institutional and regulatory changes occurred. The A00 (and later the VAOP) provided a coordinating framework for governmental bodies (municipalities, provinces and national government) and had a very clear agenda related to the long-term vision in the NMP1 and the waste hierarchy. A year later the waste industry, which at that time was also fragmented, organized itself at the national level too through the VVAV (1991), the VAOP and other branch-organizations.

The A00 played an important and central role in the restructuring of the government organization regarding waste, and in coordinating the development of a waste market (Daemen 2003). Negotiations between different layers of government and with private waste companies took place within the A00 with the ac-

tors agreeing on the general direction of creating a modern and efficient system of waste management with less waste being landfilled. The environmental movement, while being officially opposed to incineration, were not creating too much trouble because they understood that high costs of advanced systems of incineration necessitated a high tax for landfilling for burnable waste, which encouraged waste prevention and recycling (Daemen 2003). The waste companies were happy with the greater scale at which they could operate. For the A00, the reorganization of the sector was seen as a blessing, with big companies from North America such as Waste Management Inc and BFI taking over small companies. The big companies were committed to full compliance and had a strong incentive to respect the law. This period of consensus and cooperation can be understood from the period of converging perspectives and interests during the 1970s and 1980s. When the momentum for change became apparent by the end of the 1980s, broad consensus existed about the need for change, the necessity do diminish landfill and to increase the percentages of recycling and re-use percentages.

In spite of the growing number of regulations, laws and voluntary agreements, the waste management evolved towards efficient waste incineration, recycling and re-use. In a sense, Lansink's Ladder was climbed instead of descended (Eberg 1998): a slow shift away from landfilling instead of a new system based on prevention as first option. During the 1990s a combination of technological developments, regulation, market dynamics and new practices co-evolved and led to rapidly increasing ways of dealing with waste. Policy, although it partly set in motion this process and influenced the direction, with the A00 as coordinating actor, lost grip on the process because of international dynamics, market dynamics and ongoing specialisation of regulations and knowledge and expertise. Since it proved to be easier to develop regulatory policies regarding specific waste-handling methods than developing stimulating or innovative policies for prevention, the emerging system was that of a regulated market which benefits economically from waste and is highly efficient. It draws away all attention from prevention as policy or societal issue, which is enhanced by the diminished sense of urgency related to the issue amongst citizens and consumers.

In retrospect, we could argue that waste-policies have not achieved their goals of prevention. Although currently waste management seems highly effective, it is, as we have argued, still far from sustainable and in need of another transition. Environmental laws on emissions, landfilling, re-use and recycling provided an increasingly stringent regulatory context in which increasing efficiency and environmental awareness was gradually introduced. As such, the institutional strategies of dealing with the highly complex societal issue of waste management failed in terms of achieving the goals of reduction of waste production. In terms of transition management, however, we can argue that this transition was managed quite successfully in terms of the speed and the structural nature of the changes, while it failed in terms of direction. At the strategic level a small group of innovators, public opinion makers, politicians and environmental experts signalled the problem early on and a long-term orientation (vision) was developed. At this level the debate was more or less discontinued after the change process took off around 1990. Perhaps because of this, market and regulatory developments and forces took over at the tactical level and a new structure emerged. At this tactical level changes in regulation (new laws, regulatory standards etc.), market (mergers, internationalisation, and privatisation) and

new actor networks and institutions took place bottom-up. Although a national system and market were planned or at least seen as policy goals, the dynamics were not controlled and no prevention goals were formulated. Rather, policy in this phase regulated the initiatives taken up by market actors. At the operational level diverse experiments and initiatives, of which the most successful ones slowly emerged, became adopted at the regime level (behavioural, technological, institutional innovations).

At these three levels, different actors with different agendas interacted, exchanged perspectives and knowledge and developed joint agendas and plans. From a distance, the transition in waste management can be observed as a process from abstract problem definition and envisioning to concrete action in a rather linear process. It seems that fundamental reflection upon the initial goals and ambitions faded during the implementation process and a self-reinforcing dynamic came about that revolved around the idea of effective waste management regulation, technology and market. The changes in the (administrative) organization of waste management during the last decades are characterised by the adjustment of the administrative scale of waste management to economic and social developments, such as growth in production and consumption, European integration, environmental awareness and the introduction of new waste flows. A fundamental and regular reorientation towards such external changes also seems to have been absent. So, while the transition process itself was set in motion through principles underlying transition management (especially a focus on the whole system, creating space for innovation, formulating basic sustainability principles and a vision, and a co-evolution of strategic, tactical and operational governance activities), it seems that the process of transition itself was either managed through top-down regulation or through liberalization.

In fact, there was no real co-evolution between the vision and experiments, but a strategy and instruments were selected (presumably under public and market pressures). Learning and innovation therefore became minor elements of the transition, while efficiency thinking and liberalization became dominant tendencies. On the one hand, this was because business and industry took initiative and organized themselves efficiently, but on the other hand this was possible because of a lack of influence of societal organization and above all a government that did not advocate prevention and sustainability principles strong enough. Policy in this view was (willingly) overtaken by market forces and autonomous societal dynamics and because of a *laissez-faire* attitude, which excluded evaluation and self-reflection or active policies to incorporate sustainability principles, only facilitating. Perhaps at that time this was the preferred way to govern such a societal system, but also from a policy analysis perspective waste policies never seem to have been able to operationalize their grand ambitions (Eberg et al. 1998).

A sceptic would perhaps interpret the development of waste management as a business- and policy-driven process of change, in which transition management played no significant role. Looking at the development path during the acceleration, this interpretation is indeed correct. Policy decisions had been taken, a waste-market was created and regulated top-down, and behavioural change was more or less enforced through top-down development of new infrastructures. Indeed, the policies developed were intelligent and smart solutions were found to overcome the fragmentation and competition on local scale, but one could argue that this was not much more than modern policy-making. What our

System environment	Oil crisis Growing environmental awareness Economic growth Limits to growth		Leaking landfills Chernobyl Lickebaert (Dioxine scandal) Acid rain *Our Common Future* (Bruntland)		Rio Summit Johannesburg summit Liberalisation Ict (logistics)	
System state 1970	**'70s events**	**System state 1980**	**'80s events**	**System state 1990**	**'90s events**	**System state '00**
	- Lansink's ladder - Public debates - Waste as environmental issue - Sense of urgency - Waste as unsustainability 'symbol'		- *Zorgen voor Morgen* - First National Environmental Policy Plan - Clean incineration as preferred option - NIMBY		- National Env. Policy Plan 2, 3, 4 - Comm. toek.org. afvalverw. struct. (CTOA) - Market strategies - Centralization and efficiency thinking	
Waste is waste **1. landfilling** **2. re-use**	- DGMH [DGM, after 1982] - Foundation for Nature & Environment (SNM) - Landelijk Milieu Overleg - Surface Water Pollution Act - Emergency Memorandum on Environmental Hygiene - Stichting Verpakking and Milieu (SVM) - Air Pollution Act - Afvalstoffenwet (1976)	***Waste is a problem*** **1. landfilling** **2. re-use** **3. incineration**	- Ministry of VROM established - RIVM founded - Prevention and Recycling of Waste Materials Memorandum - Joint Declaration and Code of Conduct on Drink Containers - Motie Lansink becomes law - Code of Conduct on PET bottles - Guidelines for Incineration	***Waste is money*** **1. Re-use** **2. Landfilling** **3. incineration** **4. (prevention)**	- Environmental Management Act (Wet Milieubeheer - Afval Overleg Orgaan (AOO) - Packaging Covenant1 - Vereniging van Afvalverwerkers (VVAV) - Pack. Covenant II - Removal Contribution - LAP - GIBA/GIHA	***Waste is money/ resource*** **1. Incineration** **2. re-use** **3. landfilling** **4. prevention**
private transporters		**government transporters**		**Private transporters** **Enforcement by waste authorities**		
local		**regional**		**national**		
	- Recycling initiatives - development of incineration technology - landfilling sites redevelopment		- Recycling experiments - Public awareness campaigns - GIBA/GIHA experiments - Filters for incineration		- Diftar projects - Innovations (new containers for separated waste collection)	

Multi-level Map of transition management in the Dutch Waste sector, based on (Loorbach et al. 2003)

analysis shows, however, is that especially in the predevelopment phase, elements of transition management can be found; individuals with alternative ideas and solutions, a bottom-up societal movement of concerned citizens and NGOs reacting to landscape development, the influence of inspiring cognitive images (visions) such as Lansink's Ladder, the experiments and adaptive strategies related to incineration, re-use and collection. The select number of individuals at the strategic level that put the issue of waste management on the political and societal agenda did in fact, although unconsciously, accelerated and directed the waste management transition. Only when the transition process (metaphorically speaking) entered the reality of regular policy making (after the take-off), the adaptive and explorative process transformed into a formal, regulatory and implementation process.

What does this teach us in terms of transition management? First of all it shows that a transition or transformation cannot be controlled in any simple way, but that it is possible to generate a structural transformation based on a broad sense of urgency and shared values and ambitions (vision). Different developments have to come together and sustain each other, but an intelligent, future oriented and systemic orientation can form the necessary element for an adequate reaction to such developments. Secondly, it is useful to have a more or less shared long-term orientation that serves as the basis for co-ordination. Without this, policy can only react to immediate problems (act in a 'fire-brigade' fashion of putting out fires) and societal actors have no frame of reference or orientation. However, it seems necessary to reflect upon the long-term orientation regularly and connect this to operational activities. Thirdly, because policy is problem-driven and inherently focused on regulation and instrumentation, it broadens possibilities for change to incorporate other actors in governance processes. Not as participants, but as actors in their own right that can create, develop, initiate and influence. For this, they need direction and space (possibilities) which policy can offer. Finally, transition management has good opportunities to influence and direct transitions especially in the predevelopment phase. An important issue so far untouched is how to deal with the regular policy context and its tendency to formalize, structure and institutionalize processes of change. As the waste-transition analysis shows, it is a major challenge to maintain an explorative, flexible and learning-based approach when an issue becomes political and regulated.

The transition narrative illustrates how the current Dutch waste management system has emerged through a combination of societal changes and different forms of governance that responded to these changes. We have seen that the visionary elements that were part of the debate in the predevelopment phase (especially 'prevention of waste' as priority) were abandoned because of a shift in focus towards liberalization, large-scale infrastructures and a policy approach of regulation and facilitation. Arguably, the current waste management regime is based on principles of efficiency, a liberalized market and re-use and recycling. This regime is quite stable, but the fundamental question is whether we would consider this regime sustainable: does it fulfil its societal function in the environmentally, economically and socially best feasible manner? And the related question is then: will market forces bring about such sustainability since they rely on a constant and growing input of waste flows? The transition analysis and the approach of transition management make it possible to reflect systematically upon this question and possible future changes and challenges (see next section).

7.4 The future of waste management: towards sustainability?

The consequences of relinquishing government control in favour of market forces could arguably undermine the progress made during the 1980s and 1990s. At the same time an argument could be made in favour of self-regulation, particularly in the private sector, in waste management. Such an argument would be based on the institutionalization of waste management practices within major corporations and numerous firms based on social responsibility and cost savings. Indeed, the widespread adoption of environmental management system standards among Dutch firms points to institutionalization of environmental management at the inter-firm level of inter-relations, at least within the industry. However, not much progress in terms of prevention has been made so far in households, toxic wastes and construction waste, perhaps because of the low economic benefits of reduction in these areas. Without fully defining the 'unsustainability' of the current waste system, it is clear that there are a number of problems that need to be dealt with: too many materials are wasted, the current regime does not benefit from prevention, public awareness and participation are almost absent, government or public control over sector development is almost impossible (Eberg 1998) and awareness about reduction and prevention amongst waste-producers is limited. It is therefore necessary to reflect upon the current waste management regime and future challenges, especially since the societal context is forever changing and the pressure on the current waste management regime to adapt to these changes increases. This reflection includes both the substance (what should sustainable waste management look like?) and the process (how should this be realized or managed?).

With regard to the current waste management systems, in the Netherlands as well as in other Western European countries, very different choices have been made regarding goals and means of waste management. In the Netherlands, incineration and re-use are the main options, in Belgium the focus is on consumers and recycling and in England landfilling is the dominant practice. The associated institutional structures, regulation and policy practices are similarly different. However, the problems signalled in the previous paragraph are the same for all waste management systems, and so are the challenges. Some of these problems and challenges are:

- The amounts of waste produced still increase, prevention is under developed
- Very large amounts of waste are being incinerated while recycling or re-use of materials would be the preferred option.
- The new institutional context created by the European Union brings new challenges and numerous opportunities for waste management in the Netherlands.
- The new context is increasingly multi-level in terms of public-private inter-relations, multi-system in terms of the integrated social-economic-environmental policy making framework, and multi-scale in terms of the governance of socio-economic and environmental domains.
- Increasing awareness about unsustainability and resource-scarcity, which requires strategies other than solely relying on the market to bring economic efficiency and long-term viability into waste management.

The current system is visualized in Figure 7.5 which shows the relative stability of the current regime in a changing societal landscape.

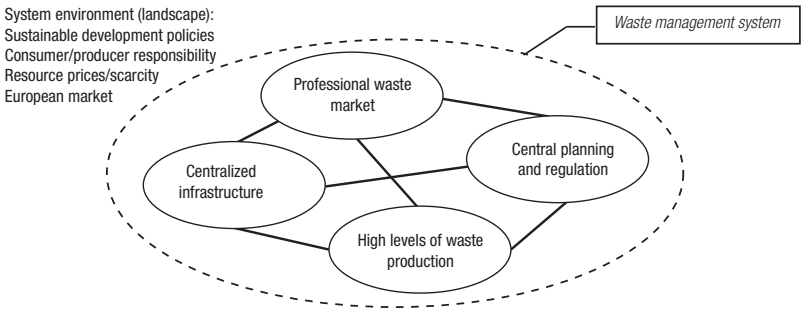


Figure 7.5 System sketch of the current waste-management system

How these developments will affect the current regimes and how the current trajectory will evolve over the next few decades or so is not at all clear. There seems not much room for further improvement or optimization in terms of efficiency, so new challenges are mainly in the field of prevention and reduction of waste-production (Schut 2002). At the European level and in some national waste management strategies, the topic of resource and materials management is emerging after the presentation of a new thematic strategy on the prevention and recycling of waste, part of the 6th European Environmental Action Plan (see: http://ec.europa.eu/environment/waste/strategy.htm). This debate on the role and goals of waste management brings together actors interested and committed to this debate and new (European) networks are emerging in this field, for example the ASSURRE network (www.assurre.org). Rationale behind a resource management approach is that reduction of waste production can only be achieved by using different, more sustainable materials throughout production chains and by dealing more efficiently with materials throughout their life-cycle. This would allow for more efficient recycling and re-use as well as more sustainable practices of landfilling and incineration. This approach, however, would mean a fundamental break with the more regulatory and technical form of waste management and would call for co-operation, participation and learning strategies. This shift constitutes a future transition to a more sustainable system of waste management which includes a fundamental restructuring of current infrastructures and institutions, a fundamental change in (political) culture and organizational routine and finally a change in waste-related practices in business, waste-producing sectors (building, agriculture, industry etc.) and households.

Dealing with societal changes in terms of creating a more sustainable system and at the same time restructuring the developed waste management systems, requires strategies that are able to deal with complexity, uncertainty and innovation. It requires a fundamental reorientation upon the core goals, values and ambitions of waste management, and a new approach towards realizing this alternative role of waste management. What is therefore required is a reflection upon the present situation and regime and how to interpret these. Since the existing structure, culture and practices will not make possible an alternative development in its initial stages (hypothetically the current regime will invest in alternatives when they become economically, institutionally or societally more

beneficial), a transition management approach seems appropriate to explore possibilities for a transition towards resources based waste management. The European level can play an important role here, in defining common basic principles for sustainable resource management (informed by national examples and innovations) that will be guiding for national level changes. When we approach this process as a co-evolution between local, national and European structures, cultures and practices, there seems to be a need for the creation of room for innovation, stimulation of innovation, experiment and learning, and a structured reflection on long-term ambitions and goals as opposed to top-down planning, blueprints or more regulation at the European level. An illustration of how transition management could be used to create the necessary room for such innovative processes and at the same time create convergence between European and national level without ignoring national specifics, is the transition management approach implemented in the context of Flemish waste management by OVAM, Flemish waste management organization.

Example: OVAM in transition

A pioneering institute in the context of changing European waste management structures, culture and practices is the Flemish waste management institution OVAM. This organization is, like almost all Western European waste management organizations, predominantly focused on management through regulation and liberalization based on ongoing specialization and diversification of knowledge and information flows. Around 2002-2003, an OVAM official (a 'transition entrepreneur') with some influence within the organization and room to develop new ideas, took up transition management as an approach to reflect upon future developments and the necessity to develop policies for waste prevention instead of or on top of waste management policies for effective handling of waste. He initiated a transition project which was later called 'food for thought' (in Dutch: *Stof tot nadenken* (Loorbach et al. 2004)), an internal OVAM project with two goals: to develop a new vision and agenda for their own organization and at the same time to 'transitionize' the regular policy context by creating room for innovation within the organization in line with the vision and agenda. I was involved in this project as transition researcher and sparring-partner for the transition entrepreneur.

A preliminary integrated systems analysis was executed based on the Dutch waste-transition case study which was adapted to the Flemish context. The additional information was provided for a large part by about 10 OVAM employees, who in this way were actively involved in the analysis. The conclusions from this study were commented on individually and discussed in two workshops with selected OVAM employees from different departments. The preliminary study had the goal of creating a shared historical narrative about the past and present of the Flemish waste management system and a shared perspective on the issue as a basis for transition management. Questions asked were for example how policy had influenced the direction of developments, to what extent a transition had occurred, what developments would influence waste management in the future, whether the current system was sufficient and/or sustainable. Such questions and the following debates cre-

ated more awareness regarding the complexity of the issue, the interdependencies between different sub-systems, the emphasis on regulation instead of prevention, the importance of reflecting on long-term developments and developing visions and agendas etc.

It became clear from the discussions between the transition entrepreneur and myself, the integrated system analysis and the responses from OVAM employees, that the current system can be considered unsustainable and that changes in society offered chances for a new transition to a more sustainable system. Such a transition would be based on principles of closed resource-loops, material cascading (use high-quality materials for high-quality products and application first; for example first use wood for products then for energy), new materials and prevention. It was clear that this implied a fundamental paradigm shift: from developing policies focused on waste as an output to developing policies focused on the use of materials so that these would not become waste. The end-of-pipe approach underlying current waste management led in practice to increasingly specific regulations and associated organizational specialization. In a sense, the sector or issue was managed 'from the outside' with the government as controller and regulator.

The integrated resources/prevention approach obviously requires intensive cooperation and interaction with waste-producers and a much more flexible, facilitating and co-producing role of the government. In terms of personnel, knowledge and (policy) instruments this would require fundamental changes: negotiators, communicators and facilitators instead of experts, regulators and controllers; generic data, cross-sector information and tacit knowledge instead of specific data, sector specific information and only expert or scientific knowledge; facilitating, initiating and enabling instruments instead of regulating, prescribing or prohibiting instruments. In terms of education, training and coaching, the new abilities and capacities should be developed in co-evolution with partners in other sectors, domains and organizations. 'Waste', in this vision, should no longer be the sole domain of government, but a shared responsibility between all societal actors. Stimulating and guiding this transition should be one of the new tasks of OVAM: find strategic partners to develop new practices and structures, transfer knowledge about innovative solutions across society, stimulate learning processes in industry and households and support all sorts of sustainable initiatives in this area. This new course for OVAM would obviously require internal support and changes in organizational structure, in human resource management, in financial structure, in communication and profiling etc. Obviously such an internal transition would require time, energy, creativity and above all long-term continuation (Loorbach et al. 2004).

In a final meeting of the project with the top-management officials of OVAM, the final report was received critically because of its focus in the analysis on what OVAM did not do or had not done, but nevertheless the importance of redefining waste management and the possibilities offered by resource management were recognized. In spite of differences of opinion within the board of directors of OVAM about the exact interpretation of the study, there was agreement on the innovative nature of the analysis and the importance

of exploring the conclusions further. The support they gave to the project materialized in a budget for a next and larger project for a transition arena on resource policies, in which also other (external) actors would be included. Their support was in part made possible through positive reactions on the initial project by OVAM employees, which created more room and understanding for the transition-entrepreneur, who would never have achieved the support without them. In the summer of 2006, the OVAM transition arena started, including some 12 innovative individuals with high social status from different societal backgrounds. In the next few years this arena will build on the initial study to develop and communicate the new vision for resource management and to work simultaneously on implementing short-term actions and experiments to contribute to this vision.

In conclusion, the integrated system analysis and the small-scale participatory process within OVAM were successful in creating room for different and more innovative concepts and strategies. Within institutionalized and specialized organizations, it is often difficult to achieve cooperation or support for structural changes because this implies breaking through existing barriers, routines and habits. A transition management approach in such a context seems a good lever to achieve more understanding and support, because it is based on the idea of social learning: people themselves conclude that there is a need for change through a structured participatory process, rather than being told this is the case. The main goal of transition management (creating room for innovation) was realized through the structured and informed debate, however much the details of the exact analysis, the ideas for change, the possible impact of specific trends and such were disputed.

Box 1 Example OVAM in transition

7.5 Conclusions

A transition occurred in the Dutch waste management system. This transition included interacting changes in technology, infrastructure, regulation, institutions, market, practice and culture. The transition was a result of external changes (pressures), innovations, crises, self-organization of social actors as well as planning and policy. The combination of these influences led to the emergence of a waste management system in which waste is money, and in which efficiency, centralization and liberalization are the cornerstones of the dominant regime. The regime is in a dynamic equilibrium: power-relations are stable, the waste management infrastructure is sufficient, regulation and policy are formulated and controlled and recycling is common practice. However, societal changes and new innovations start to increase the pressure on the regime: alternative paradigms, technologies, routines and structures are developed as the unsustainability of the current regime becomes increasingly visible and perceived as problematic. Examples are issues such as the scarcity of resources, pollution and waste, waste-transports and other symptoms of the unsustainability, which do not (yet) have an impact like the environmental concerns during the 1970s and 1980s but which have this potential.

The future of waste management is open: satisfaction with the current system could remain and not much will be changed, or concerns about the unsustainability will grow stronger and increasingly put pressure on the regime to change. For various organizations, however, in particular public institutions, government and environmental NGOs, sustainability should be a concern and it is therefore feasible that an increasing number of actors from these groups will join the debate that has already started and become an influence in a new transition. The new institutional context created by the European Union brings new challenges and numerous opportunities for the national waste management systems, also in the Netherlands. The new context is increasingly multi-level in terms of public-private inter-relations, multi-system in terms of the integrated social-economic-environmental policy making frameworks, and multi-scale in terms of the governance of socio-economic and environmental domains. The main transition challenge seems to overcome pressures to rely on market forces to induce economic efficiency and long-term viability in waste management without strong principles of sustainability as conditions for that market. There is therefore a strong tendency towards liberalization and the development of a regulated European market.

However, a strong argument could be made for a fundamental reorientation upon the role and goals of waste management in society. Meeting the challenges posed by sustainability (creating highly material efficient economy) requires a transition in itself. But this time around, the transition is even more complex and difficult since a highly sophisticated regime with institutional and economic power is in place. Also, economic growth, technological progress, centralization and more efficiency cannot be the carriers of this transition: it needs to be based on changes in perspective, routines and practices and on social learning. The example of OVAM illustrates that such a reorientation is possible on a small scale and within existing institutions. It also shows that a transition management approach offers possibilities for engaging in this process. Although the structures of the different national waste management systems in Western Europe are very different, they are currently all under the influence of the same trends and are faced with similar challenges. The future lies in European policies at a strategic level and different national systems based on these principles and combined with national specifics like policy culture, geography, tradition and such. In this context the efforts of developing European resource policies seem promising, but it will require above all fundamental efforts within, between and outside vested institutions to create room for innovation, new perspectives and new structures.

Chapter 8

Transition Arena Parkstad Limburg

8.1 Introduction

This chapter deals with the project 'Parkstad Limburg envisioning'. This project is in many ways a crucial case history for the development of transition management as presented in this thesis. The project involved the organization and facilitation of a participatory envisioning process in order to provide an inspired future orientation as a basis for further development and governance of the region. The character of the project was that of a scientific consultancy project in which the project-team was expected to deliver results within a limited amount of time, but at the same time use innovative tools and methods based on scientific research. Notwithstanding the normal pressures of this type of project such as the fixed time-budgets, a responsibility to produce predictable results and the necessity to present a blueprint process design, the researchers involved in this project could also invest research time and explicitly approach the project as an experimental process. This meant that it provided the ideal context for the explorative development of transition management in at least three ways.

Firstly, the project provided the experimental context in which a number of hypotheses and ideas underlying transition management could be tested and refined. For example, the ideas about the role of frontrunners and visions and the need for an integrative approach could be implemented, tested and evaluated. Moreover, the possible impact of a transition arena and a transition vision on the regular policy process could be evaluated. Secondly, it provided a context in which we could learn about the role of transition managers and researchers in structuring process and substance. This related directly to our own role within the project and our research approach. In the third and perhaps most important place, the project provided a context which allowed for rapid development of the initial theoretical ideas and the formulation of a number of novel concepts based on practical experience.

This chapter is structured in different sections. After the general introduction and a sketch of the Parkstad Limburg region (8.2), section 8.3 deals with the process that led to the formulation of the project proposal and the acceptance of the transition management approach by the commissioning authorities. Section 8.4 describes the actual transition arena process leading up to the final vision and transition agenda. In section 8.5 the effects of the project and our own role in it are evaluated. In section 8.6 the lessons learned concerning theory, methodology and practice of transition management are formulated. These are an important source for the theoretical chapters in this thesis (Chapters 3, 4, 5 and 6). Finally, we draw some general conclusions regarding the transition arena methodology and its impact on the development of Parkstad Limburg in section 8.7.

8.2 Parkstad Limburg: the region

Parkstad Limburg is a regional cooperation between eight municipalities in the South-East of the Netherlands. In 1965 the Dutch Government closed the national coal mines (DSM, De Staatsmijnen), which resulted in a dramatic rise

of unemployment in the region.[26] Low education levels and polluted sites contributed to high levels of occupational health problems to this day. Although compensation to the region was provided in the form of relocation to Heerlen of national institutes like the national offices of the Pension Fund Agency (ABP) and the Central Bureau of Statistics (CBS), a period of negative and introvert development characterized the region until the end of the nineties. The downward trend was reinforced by the peripheral location of the region in the southeast of the Netherlands and far away from the national government in The Hague. In short: the transition towards a flourishing regional development of Parkstad Limburg stagnated. A lack of governmental coherence and strategy added to the problem by not drawing substantial cash flows from national government to the region, so that apart from the relocation of large institutions, not much extra investment was made in the region. In contrast to this, the neighbouring city of Maastricht did manage to draw structural funds for cultural and economic development in the region and also succeeded in founding a University. Combined with the low level of coordination between local authorities within the region, this resulted in persistent problems of various sorts (see par. 8.3 for a more extensive sketch of the region).

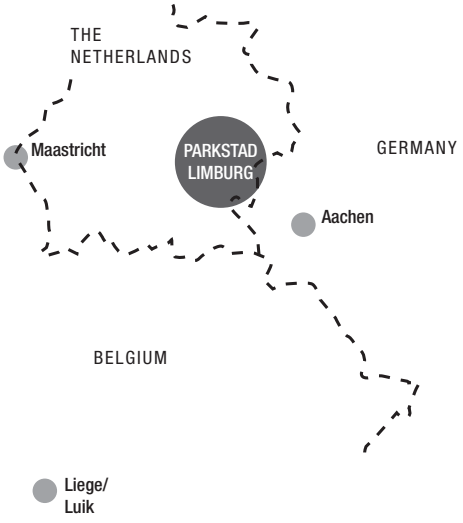


Figure 8.1 The Parkstad Limburg Region

The problematic development of the region was recognized by local organizations. In 1998 three well-known and influential regional actors[27] developed a vision in

26 As a result of the transition from coal to gas, see: Rotmans, J., R. Kemp, M. Van Asselt, F. Geels, G. Verbong and K. Molendijk (2000). *Transities & transitiemanagement: De Casus van een emissiearme energievoorziening.* Maastricht, ICIS / MERIT.

27 Mr. T. Wöltgens, mr. J. Pleumeekers and dhr. J. Zuidgeest.

which municipalities would cooperate to stimulate regional development. The municipalities of Brunssum, Heerlen, Kerkrade, Landgraaf, Onderbanken, Nuth, Simpelveld en Voerendaal came to an agreement to start a form of cooperation between the municipal councils. In 1999, a regional agenda was set which incorporated four themes: economic, social and spatial planning policies and strategic efforts concerning attunement between the region and provincial, national and international (EUregional) governmental bodies and policies. To underline the importance of regional cooperation, the new name 'Parkstad Limburg' was presented. The overall goal was formulated as follows: 'to raise the social-economic development of the region to the same level as the rest of the Netherlands and to make use of the advantages of the location near the border with Germany and Belgium, within the next 10 years'.[28] Parkstad in this phase was mainly a governmental idea and inhabitants did not recognize regional coherence or felt a sense of urgency to consider regional cooperation. Their identity was that of the municipality, perhaps the province, but Parkstad Limburg had never been a 'natural' entity and the need to become one was not recognized. In fact, the main feeling was that of scepticism and negativism, resignation and distrust between municipalities (mainly between the urban municipalities of Heerlen and Kerkrade and the more rural ones that suspected Heerlen and Kerkrade to want to expand at the expense of the smaller municipalities).

8.3 Predevelopment of the envisioning process (1998 – November 2001)

8.3.1 Warm-up period

In spite of the governmental agreement to cooperate, the individual municipal councils were far from enthusiastic to give up local autonomy. During the first years of the cooperation only small-scale changes were accomplished, such as meetings between local officials, the establishment of a regional council (in which there was one official representative from every municipality) and the development of a communication plan. Agreement was reached upon two regional and communal projects: a cross-border environmental planning and economic development plan between Parkstad Limburg and the German Aachen Region and the development of a 'regional structure' plan. Pretty soon, it was concluded that the two projects formulated were quite similar and should be integrated into one project dealing with the future of Parkstad including an environmental and policy plan. This 'spatial planning vision' for the region should have a time horizon of 20 years or more and take into account social-cultural, economic and ecological elements.

The ambition of simultaneously envisioning a desired future of the region and making progress in terms of cooperation and regional integration, provided quite a methodological challenge. According to some, the serious social and institutional barriers for the necessary change towards a sustainable region required an innovative, integrative and interactive approach; others questioned the need for an integrative vision per se. The International Centre for Integrated Assessment and Sustainable Development (ICIS) was invited to perform a preliminary study

28 Governmental policy-agreement ('bestuursovereenkomst') Parkstad Limburg, February 1999.

on feasibility and need for an integrative approach and vision. ICIS is an institute at Maastricht University and specializes in integrative studies and sustainable development decision-making processes. Professor and ICIS director Jan Rotmans and Martin van de Lindt from ICIS had already had contacts in the region since mid 2000 and were asked to perform an exploratory study to address both problems of process and substance. To prepare for the vision development that was to follow, an integrative analysis of the region was made using the SCENE-stocks and flows model (ICIS 2001; Grosskurth and Rotmans 2005).

In September 2001, a meeting between local governmental officials[29] was held in which the problems facing the region were discussed. Jan Rotmans facilitated and structured the discussion. At that time he was director at ICIS and responsible for the acquisition and execution of the project. In this discussion, the interrelations between problem areas as well as the need for change were pointed out by the participants. This stimulated a kind of 'sense of urgency' among the participants. In fact, this was the first meeting where all participants shared the same definition of what constituted 'Parkstad Limburg' and supported the need for a more societal approach that included actors from diverse social background towards developing a regional change agenda. This in itself constituted a change of standard government policy regarding regional development because for the first time the participants of the meeting seemed willing to hand over the reins to regional and local representatives.

A recurring theme during the discussions at this meeting was the history of transition the region had experienced. Based on a rough analysis by ICIS, three different transitions were distinguished. The first was the transition from an agricultural region to a mining region. By the end of the 18th century, industrialization was taking place and large amounts of coal were found in the region. This led to a rapid development (in fact, an economic 'boom') in the region. In 1902, DSM was established and during the next two decades a number of coalmines were developed. In the 1930s production reached a peak and the growth stabilized. When during the 1960s a decline set in and some mines were closed by the National Government, external pressures more or less forced the region into a new transition. This transition was envisaged to lead to a modern and services oriented region, and was 'governed' by relocating large offices to the region. However, the vision did not go well with the dynamics of the region, the labor skills and the culture, and opposition and negativism regarding the top-down vision persisted until well into the nineties. In transition terms, the region experienced a 'sub-optimal' development path whereby structural change was forced top-down and never became supported bottom-up. In this sense Parkstad Limburg became locked into an unsustainable trajectory. In the vision of ICIS, this could be interpreted as the predevelopment of a new transition, so that the fundamental question for the region as a whole should be where they wanted to go from here and whether they would 'let the transition happen to them' or start to think ahead about 'where they wanted the transition to go'.

29 'Administrators conference' ('bestuursconferentie') which included mayors and various other high-ranking officials.

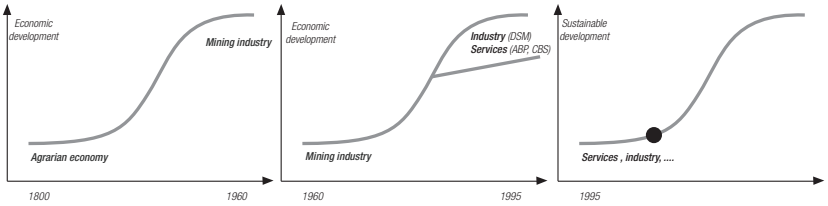


Figure 8.2 Overview of historic transitions of the region (from Jan Rotmans' presentation, Schinveld, Sept. 17, 2001)

8.3.2 Preparations for the project (November 2001 – February 2002)

The first step after the government conference was to set up a project for the development of a regional vision. This resulted in the ICIS quotation 'Vision development for Parkstad Limburg in transition' (ICIS 2001). Unlike a blueprint for regional planning, the project aimed to develop an overall vision, which would form an integrative frame for further development of the region and regional policies. This was in line with the general approach to making policies for sustainable development as used within ICIS. This approach was based on a blend of systems thinking and a participatory process. The terms transition and transition management were not commonly used at that time within ICIS or within policy making in general, but the report by Rotmans et al. (Rotmans et al. 2000) and the NMP4 (VROM 2001) had just been finished for publication. Within ICIS, a small group of researchers had been involved in developing the transition concept (Jan Rotmans, Marjolein van Asselt, Kirsten Molendijk and Rutger van der Brugge) and the Parkstad Limburg project seemed a perfect opportunity to implement, test and further develop the approach of transition management. The ICIS-project team for Parkstad Limburg included Jan Rotmans, Martin van de Lindt, Nicole Rijkens and Derk Loorbach.

The central goal of the project was formulated in broad terms:

'the development of an integrated, coherent long-term vision for Parkstad Limburg focused on:

- creating a vision based on the transition approach
- contributing to socially accepted policy decisions
- developing a realistic and cyclic implementation plan
- contributing to inspiring visualisations and presentation forms for the different policy visions and –choices' (ICIS 2001)

As basis for the project, the ICIS quotation mentioned a basic problem analysis as a starting point for the project: a perceived increased social complexity, interlinking of local, regional and (inter)national scale levels, increased uncertainties and the impossibility of blueprint (social) planning. It was stated that this necessitated a creative, interactive envisioning process that would be an explorative collective search effort for the future, rather than a classic agenda-building process. ICIS claimed to have developed a methodology for facilitating and organizing such processes. Generating enough support for such an experimental project approach required a lot of effort and persuasion. At the above-mentioned

governmental conference, consensus on the approach was found amongst key governmental actors, but preceding and following this meeting a large number of informal meetings and lectures were held between Jan Rotmans and Parkstad representatives. Especially at project management and bureaucratic level people rather opted for a classical project-approach with a formalized control-structure and a highly structured project-proposal.

The term 'transition management' was not used once (!) in the first project-proposal, but based on the transition concept; the approach was defined as multi-domain (integrated strategy), multi-level (in time and in space) and multi-actor (from different social groups and with different knowledge and experience). Evidently these were also the characteristics of transitions as mentioned in (Rotmans et al. 2000). The project approach included three phases:

- **Project phase 1: Integrated system analysis (Situatieschets)**
  An integrated SCENE-analysis of the region based on the stocks-and-flows model as approved in the meeting between local governmental officials
- **Project phase 2: Scenario analysis**
  An exploratory scenario-analysis for Parkstad Limburg resulting in different images for the future.
- **Project phase 3: Vision**
  Development of a concept vision on a desired future for the region in the context of the scenarios developed.

The results together would form the 'Structure vision Parkstad Limburg' and the project was envisaged to run for 14 months for the total cost of fl. 240,000 (some 110,000 Euros)[30]. Of this budget, one third was reserved for the scenario analysis, one third for the vision development phase and the rest was to be spent on the systems analysis, project management and the facilitation of interactive sessions. Over 20,000 EUR was reserved for unforeseen events. During the first few months of 2002, the project approach was discussed with officials and approved and it was agreed that a 'core-group' would be formed including diverse 'frontrunners' from the region. The daily board of Parkstad Limburg finally commissioned the project, with the understanding that they would not be involved in the actual process.

8.4 The envisioning process (February 2002 – September 2003)

In this section the actual envisioning project is described. The project was divided into three phases. Although in practice the project more or less followed the initial plan and is here also described in three phases, the actual process differed fundamentally from the initial design. Because of evolving insights, experience and new opportunities, new activities were included in the project, methods were refined or other tools and methods were used. The preparatory phase (section 8.4.1) included besides the Integrated System Analysis also an extensive actor analysis and selection process. The second phase (8.4.2) was dominated by

30 The first budget calculation made by ICIS was over fl 400,000 (EUR 180,000), but was brought down due to a limited budget of Parkstad Limburg.

discussions about the state of the region, the persistency of the problems and possible future scenarios. Initially only a scenario-study was foreseen. In the third phase (8.4.3), a transition vision and transition agenda were developed, which included also strategies and concrete propositions for implementation. In fact, this was much more than initially promised (a coherent spatial vision).

8.4.1 Project phase 1: preparation of the envisioning process (January 2002 – June 2002)

Integrated system analysis — A first step in the project was to collect all the relevant information about the region. From the start of Parkstad Limburg in 1998/1999, a number of studies were set out concerning the regional profile, economic structure and performance and image. In addition, various studies and quantitative data were available related to environmental quality, crime- and safety-figures and the demographic profile of the region. Besides regular data on the state of the economy and the population, a study on the Housing needs of the regional population was influential (WBO, *Woningbehoeftenonderzoek*), because this clearly showed the negative position households had in Parkstad Limburg as compared to the rest of the Netherlands. It also showed the negative perspective on the quality of life of the region and the need for better and more modern housing. The various aspects of Parkstad Limburg were combined in the SCENE-model for Parkstad Limburg as presented on September 17th. In the preparatory project, a rough analysis was made of the interrelations (flows) between the stocks.

As a formal start of the envisioning project, a large kick-off meeting was held with over 80 representatives from the world of business, education, research institutes, intermediaries and government officials of the region. At this meeting, which was held in the Parkstad Limburg Stadium on February 17th, 2002, the system analysis was discussed and validated, meaning that the participants agreed on the demarcation of the system. They also supported the rough analysis regarding some of the major problems facing the region. Furthermore, consensus was reached over the need for (structural) change and the overall importance of the project. Finally, a first list of possible participants in the project was made based on personal interest to contribute. This list included representatives from business and industry, small enterprises, education, cultural organizations and non-governmental and intermediary organizations.

During the period February-August 2002, the so called *Situatieschets* (Situation sketch, (Van de Lindt 2002)) was composed by ICIS. It was based on the preliminary study discussed in September 2001, but further refined and specified based on newly provided data and information and based on contributions during the kick-off meeting and other discussions. In this report, a historical analysis of the region was combined with an integrated assessment of the then current state of the region (perceived as a complex social system). It was explicitly based on the SCENE-model and the transition concept; it distinguished between external trends and developments, the 'system' structure in terms of stocks-and-flows in three domains and possible scenarios for the future. Obviously the main part was the stocks-and-flows analysis in which the different stocks were taken up as different paragraphs where existing information was taken up and thus structured. The first draft of the document was primarily the result of integration of existing studies and data, desk research and input from specific experts and

individuals. This first draft was extensively discussed with the participants in the envisioning process and evolved into the final document (see next paragraph). The document consisted of 5 main elements:

1 a historical overview
2 a sketch of the socio-cultural stocks
3 a sketch of the economic stocks
4 a sketch of the ecologic stocks
5 the surrounding regions of Parkstad Limburg

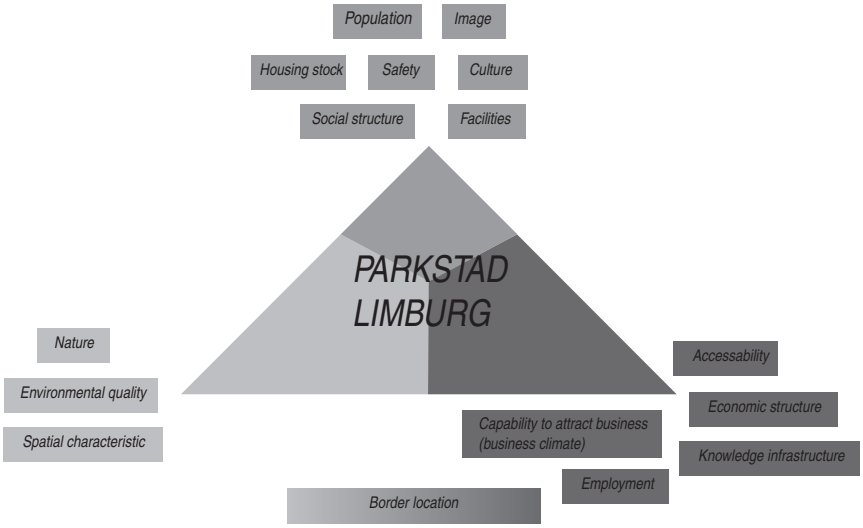


Figure 8.3 SCENE-model Parkstad Limburg as presented on February 17, 2002

The document was concluded with an integrated meta-analysis that described Parkstad Limburg as a system and analyzed its state of development as predevelopment, but close to take-off (see Figure 8.2). The following text box is taken from that synthesis and gives a good idea of the persistence of the problems facing the region and the way in which was thought about the way forward at the time.

Parkstad Limburg as a region is located in the middle of the dynamic regions of Aachen (Germany), Liege and Hasselt (Belgium), and Maastricht (the Netherlands). The region is confronted with problems that are far greater than local authorities can handle, whereas governance is still organized at the level of the municipalities. These problems are complex: multi-domain, multi-level and multi-actor:

– **Socio-cultural domain**: In Parkstad Limburg, the population (ca. 270,000 inhabitants) is ageing and young people leave the region in search for education and employment elsewhere, which leads to a decrease in over-

all population. Educational levels and income levels are relatively low compared to the rest of the Netherlands. Social cohesion is strong due to cultural ties, local community life (carnaval, marching bands and leisure clubs) and good local facilities. Crime is a nuisance, especially in Heerlen and Kerkrade, mainly drugs-related. The housing stock is dated and there is an overall shortage; there is a surplus of cheap family rental homes and a shortage of more expensive houses, leading to social segregation and problem areas. In view of the ageing population there is also a shortage of service flats for the elderly. On a more positive note, the living area is valued highly, especially in the more rural and small municipalities. Overall, there are not enough attractive living areas and houses to attract new citizens.

- **Economic Domain**: 35% of the population find employment in the (mainly product-) industry, 20 % in services. Tourist industry (1 million visitors every year) is an important part of the economic structure. As a result of the mining history, unemployment levels are high (especially long-term unemployment) and there is a large degree of occupational disability (diseases like lung diseases (black lung), rheumatism and back injuries). The activities of research institutes and small and medium enterprises are attuned to a certain level, but there is quite a misfit between core research fields of med-tech and ICT and (application in) industry and business. There is enough room for new business locations, but because of the lack of high-skilled labour and the peripherical location of the region there is not a lot of interest from the side of business.
- **Ecologic domain**: Main selling point of Parkstad Limburg is its landscape and cultural heritage. There is a very high quality in nature and biodiversity, although there are some highly polluted former mining areas. The hills, fields and small streams combined with the castles, large old farmhouses and picturesque small villages make a very attractive recreational and living area. This forms the spatial characteristic of Parkstad Limburg: a continuous alternation between green and built-on areas. Although this can be seen as strength, it has also led to an incoherent and fragmented spatial structure so that most citizens do not recognize the park-city landscape. The quality of air, soil and water is pressurized by pollution mainly from neighbouring areas (like the German Ruhrgebied) and nearby airports.

To sum up, one could say that Parkstad Limburg is still dealing with (and living in) the past. The dominant culture is introvert and resigned and people are not expecting much progress but find comfort in local communities. Due to the introvert political culture, cooperation is difficult and development at the level of the region is cumbersome. Extrapolating the negative trends would lead to an even more unsustainable development of the region, which is already one of the worst in the Netherlands. This necessitates not only cooperation at the level of the region, but also an integrated, interactive and long-term effort to turn this around and generate a sustainable development. Important corner stones for an envisioning process are therefore:

- the guiding principle of sustainable development
- the network principle (Parkstad Limburg as network of networks)
- fostering small scale development by operating on a larger scale (protecting small scale facilities by creating a network and thus operating on a larger scale)
- developing spatial cores that hold different levels of functions and facilities.

Box 8.1 Summary from 'Synthesis system analysis Parkstad Limburg' (Van de Lindt 2002)

Developing the transition arena and process design — The selection of participants and reflections on the preferred process design and methodology already started during 2001. In this period, intensive discussions about transition management were going on within ICIS and between ICIS and the project managers and government officials Frans Vonk (Heerlen) and Ton Kleynen (Kerkrade). Frans Vonk had been involved in Parkstad Limburg for years, working together with Joep Thönissen, then managing partner of Kolpron (nowadays called Ecorys), an economic research and consultancy organization that had executed a number of economic studies for the Parkstad Limburg bureau. He suggested to involve ICIS as partner for the project and made the contact with Jan Rotmans early 2000. It took until the summer of 2001, after some intensive discussions and negotiations alongside the preliminary ICIS study, before a transition management team was formed. Ton Kleynen was involved in the transition management team as representative from the other large municipality in Parkstad (next to Heerlen), but especially because of his background in spatial planning, to be a central element in the *Structuurvisie* (literally translated a 'structure vision'). Martin van de Lindt was involved on behalf of ICIS to become project manager. The two government officials would be the ones most involved in the process (besides the ICIS staff), and became (very critical) 'supporters' of the project.

The **initial organizational structure and process design** envisaged in a later addition to the ICIS quotation, involved a core group (literally called frontrunner-group), a steering board, a reflection and advisory board, transition management team and 'transition teams' (Loorbach and Rijkens-Klomp 2002, version May 29), see Figure 8.4. This was done on explicit demand from the project leaders, although ICIS strongly opposed such a structure, which they found to be too rigid, and formal and hampering creativity and flexibility. In the period between February 2002 and February 2003, the process of developing the organization, developing an integrated long-term vision and transition paths and setting a short- and mid-term agenda was scheduled. A process was designed to achieve these goals, which included core group meetings and a meeting with the advisory board. It was quite an ambitious plan in which in the first meeting of the core group, the systems analysis would be discussed and transition themes selected. After that a meeting would be held with the larger advisory board to reflect on the approach. After that the transition teams would be formed to explore the themes selected and develop target images and transition paths that would be integrated into an overall vision.

A month after the initial process design, ICIS had adjusted the proposal for the process design. This time it was based on the transition management cycle with ten steps which had been developed in the meantime (see also par. 8.6). This first version of the transition management cycle, the basis for the transition management cycle presented in Chapter 5, was then visualized as follows:

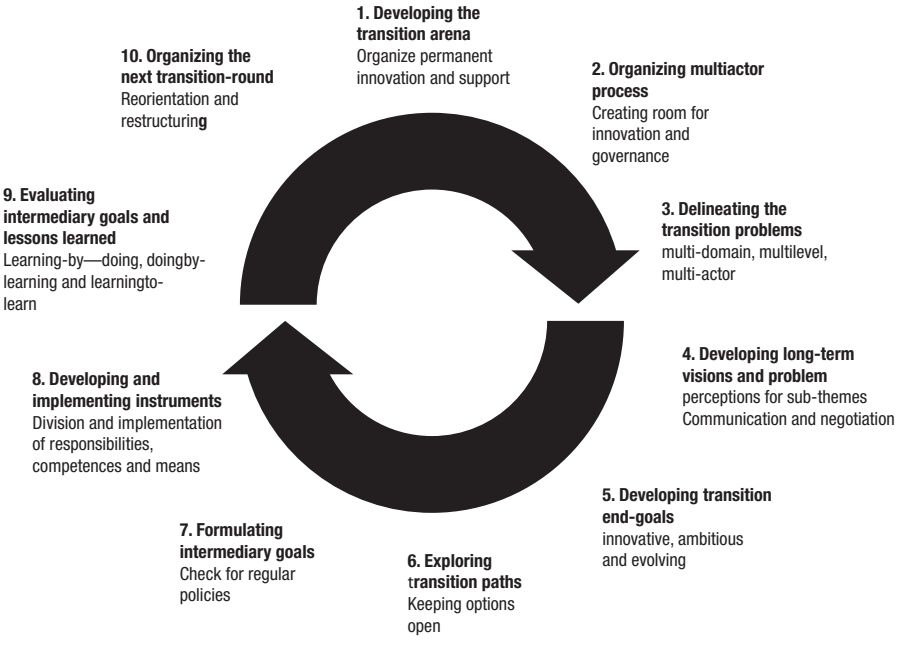


Figure 8.4 First (ten step) version of the transition management cycle (Dirven et al. 2002)

In the design, these steps were combined into three phases. The most notable changes were the term 'transition arena' instead of core group and putting the development of an integrated vision before the development of the transition paths and agendas. The changed process design was the result of new ideas developed elsewhere but also emerged out of the interaction within the transition management team, where the government officials were slowly introduced to the transition management approach and could participate in the specific adjustment of the general ideas to the specific context of Parkstad Limburg. In short, the three phases were redefined, and the different activities mentioned in the quotation and the initial design were structured in each phase:

1 arrangement of the transition arena, organization multi-actor process and demarcating the transition-problem
2 developing an integrated target image and exploring partial-transitions (sub-themes)
3 exploring transition paths and formulating transition-action plan

For the organizational structure a new design was made as a compromise, taking into account the first design as well as the demands from the commissioning board of Parkstad Limburg and the local municipal boards involved. In part, a core-group approach was already opted for, but this was now realised through the use of a transition arena and transition teams (working groups on subthemes). To minimise possible negative influences of the advisory and steering groups through formalising the process and demanding short-term concrete results, these groups were placed in a peripheral and somewhat unclear role. This was in many ways a unique approach, since the daily board and the related Parkstad Limburg officials were the principle financiers of the project, but now put in a secondary role and position within the project. The discussions about these and other issues were quite intense, on the one side the *officials* asking for more concrete and clear definitions, goals and methods, on the other side the ICIS team feverishly trying to create enough space for an innovative approach while simultaneously making this approach concrete.

Examples of questions regarding the transition management process posed to ICIS by the commissioning government officials were:

- What will be the function of the core-group (solely exchanging information?)
- What will be their output and what will be their input?
- Will the composition of the group stay the same?
- What will be the agenda of the core-group?
- What will be their relationship towards the steering group and the advisory board?
- What is a transition path or transition scenario?
- What will be our role?
- How do we keep all municipalities involved (Nuth already left the collaboration and the more rural municipalities threatened to withdraw because of dominance of Heerlen as city and regional core)?
- What will be the end result of this process?
- How do we handle the different kinds of resistance against this approach?
- What do we do during holiday seasons when we can make little or no progress?

Simultaneously with the development of the process architecture, project leader Frans Vonk was involved in **inviting and selecting possible participants in the core group**. A number of selection criteria were defined by ICIS:

- Representatives should come from different backgrounds so that different societal perspectives would be represented (business, NGOs, intermediairies, knowledge institutes and government) equal distribution among societal representatives
- The core group should be limited to a maximum of 15 people based on the idea that it would be better to develop an in-depth vision before sharing it with the larger public
- The individuals should have an expressed desire to innovate
- The individuals should have the capability of strategic thinking, of (temporarily) letting go of short-term concerns

– The individuals should have a certain level of authority in their field of work and have a good network.

Box 8.2 Initial arena selection criteria

Already at the kick-off meeting of February 17th, a large number of people expressed interest to participate. Some 150 people from all backgrounds were invited, 60 were present (77 registered but 17 gave notice that they could not make it) and 40 more answered they were interested but were unable to attend. Out of this list of over 100 people, a shortlist of 15 people was made based on the criteria. The other people were invited to join the advisory board, which was to be consulted and updated by the core group during the process. The shortlist was reduced to 8 people but expanded again to 16 based on the idea that the busy schedules of the participants would not permit them to be present all the time. Frans Vonk added two other criteria to the selection: a major representation of people from the region and a mix of people from Heerlen and from the other municipalities.

Interviews were held with possible participants and possible chair Chris Dewulf, director of the Limburg Development Company. This organization focuses on strengthening provincial economy through facilitating interaction between business, services and governmental bodies. A first meeting based on the initial process design was held on May 31st, in which agreement was reached on the proposed process, the selection of participants and organization. Dewulf expressed agreement to participate and be nominated as chair but was also hesitant to accept the transition management approach. He posed some critical remarks regarding the state of theory development, the experimental approach and the limited level of detail regarding the implementation of the plan. Other attendees besides Dewulf were A. Sakkers (mayor of Heerlen), J. Thönissen (managing partner of Kolpron[31]), R. Wever (head of the Parkstad Limburg bureau), F. Vonk and T. Kleynen on behalf of the project management and M. van de Lindt, N. Rijkens and myself on behalf of ICIS. In the end, agreement was found on the composition of the transition arena, see below.

Members of the transition arena (core group) and their affiliation

- Chris Dewulf (chair, Director Liof)
- Kor Bonnema (Building company Stienstra)
- Helmut Breuer (professor and honorary consul of the Netherlands in Aachen)
- Jan Brey (Care-organization the 'Mondriaan Stichting')
- Joost Dijkstra (chair group of local industries)
- Jacques Gorgels (director housing and living foundation Weller)
- Karel van Knippenberg (provincial newspaper Limburg Dagblad)
- Wien Kohl (Arcus higher education)
- Herman Langeveld (Tracé)

31 Joep Thönissen was envisaged 'transition manager' but before the project was approved he accepted a position in another province. ICIS had to take over his tasks (without compensation).

- Peter Ligtenberg (Local business entrepreneurs organization LOZO)
- Kees Lindenbergh
- Jacques Mikx (LIOF)
- John Monsewije (Open University)
- Anja Nieuwierra (director regional tourist agency VVV)
- Bas Schoonderwoerd (director Parkstad Theaters)
- Harry Schrijnemachers (Limburgs employers association, LWV)
- Frans Vonk (city of Heerlen)
- Ton Kleynen (city of Kerkrade)
- Jan Rotmans (ICIS)
- Martin van de Lindt (ICIS)
- Derk Loorbach (ICIS)

The 'transition arena' was defined as 'the actors involved in actively pursuing a sustainability transition for the region' (i.e. involved in the project), so this included the core group as well as transition teams, possibly 60-100 individuals. This is visualised in the picture taken from the so-called *Startdocument* (kick-off document, (ICIS June 25, 2002)). Note that the term 'transition arena' was used for the whole network of actors and groups involved in the project and not only for the core-group. Only later on during the project, the term was increasingly used to refer to the core-group (similarly at national level, 'transition arena' was initially used very broadly and loosely to imply a 'network of changers').

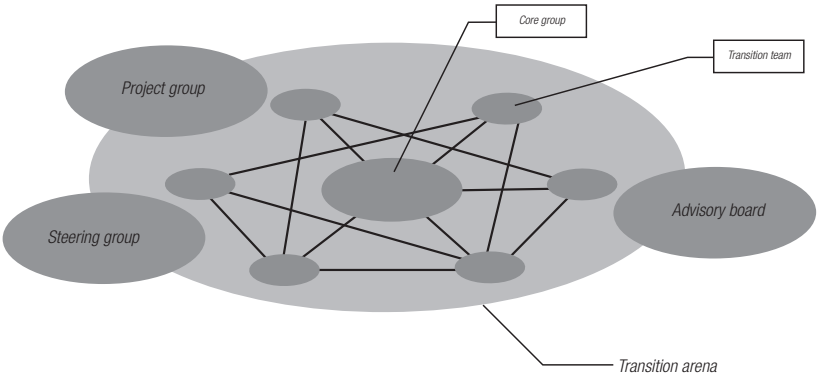


Figure 8.5 Organizational structure for the envisioning project

8.4.2 Project phase 2: exploring possible futures for the region (June 2002 – December 2002)

Everything was set to start the envisioning process by the beginning of June 2002. The first draft of the system analysis was complete, a process design was approved, participants were selected, an organizational structure agreed upon and boards formed. The selection process was based on the selection criteria mentioned before (Box 8.2). It was found that the criteria could not be used too rigidly but as rough guidelines were very functional in composing a functional and effective transition arena. It for example was impossible to assess personal

capabilities of each individual in a strict sense, but it was possible to identify strategic individuals based on experience of the regional actors involved and personal communication with possible participants. The experiences in this selection procedure had an important impact upon later research in this area and accordingly the development of more strict criteria and methods for assessment and selection. A communication plan was developed, explicitly stating that the core group activities would be kept out of publicity, but that through other types of activities (expert-meeting, public discussions, public lectures) people would be able to get involved. A chair was selected and a date was set. The selected core group members were sent an invitation to formally join the core group.

The **meetings of the transition arena** were organized between June 2002 and September 2003. The meetings were held in inspiring venues such as castles and historical houses throughout the region. This underlined the focus of the project on the region itself and also provided the proper atmosphere for developing unusual, innovative ideas and new plans and agendas. In a period of 11 months, the core group met 10 times including a meeting with the advisory-board (people who attended the kick-off meeting as well as other interested actors). In this section we briefly describe the process the transition arena went through.

Getting started with the transition arena — The first meeting held was an introductory one, in which the mayor of the city of Heerlen was present to welcome the participants and underline the importance of the project. It was a rather formal meeting in the sense that participants introduced themselves, the project plan was presented and a short introduction on transitions and transition management was given. Mr. Dewulf was nominated as chair, and unanimously appointed. Although a number of people were already acquainted in some way, the rest of the meeting was used to get acquainted in a more informal way.

The actual process therefore started at the second meeting, where the initial systems analysis was presented and discussed. This proved to be more complex than anticipated by the transition management team; there was dissensus about dissent on the urgency of the problems or even about the existence of specific problems. Although most participants agreed that to some extent the historical development of the region had led to underdevelopment in the economic sense, the feeling some had was that overall the region was in much better shape than comparable other regions in the Netherlands or even the bigger cities with their own specific problems. Furthermore, the participants did not immediately recognize each other's problems or were unaware of them. For example the problems of organizing tourist accommodation on a regional level or the environmental problems related to spatial development were not immediately seen as central or very urgent. On the other hand, almost all participants regarded problems such as the ageing population, the economic and mobility problems as important.

During this discussion, the analysis was enriched with new data and information in order to deepen the discussion and to stimulate the problem structuring. For example, comparisons were made between Parkstad Limburg and comparable regions such as the Tilburg region (a former textile industry region) and the Twente region (a cluster of cities with plans to become a 'knowledge region'). Also more information was gathered on the levels of pollution, crime and health within Parkstad. Although a number of issues would come up again from time to

time, by the third meeting of the transition arena a general consensus emerged that there was a sense of urgency to act because of the multitude and complexity of the problems in the region.

First contact with the outside world — With the project now running for a couple of months and almost half a year after the kick-off meeting, the project leaders and commissioning board requested a meeting with the advisory group. Within the transition management team, there were doubts on whether to organize such a meeting since there were no concrete results in terms of plans and actions; so far there was 'only' an extended problem analysis and a consensus within the transition arena on the urgency of the problems and the need for a transition. In process terms this can be regarded as substantial progress, but in product-terms it was not yet an impressive output. But because of the pressure from the external societal environment and the regular policy circles the meeting was organized anyway.

The general feeling of the meeting with the advisory board, held on July 3rd, 2002, was that of confusion and tension between academic theory and day-to-day practice. In the presentations, emphasis was put on the transition approach and on the integrated systems analysis. For the audience, consisting of businessmen, representatives from local organizations and in general people of stature in the region, it was far too abstract. One of the initiators of the 'idea Parkstad Limburg', Thijs Wöltgens illustrated this by stating that 'this will probably provide a good case study for this guy's PhD, but I can't see what good it will bring us'. Another exemplary remark was from a regional hotel-owner who asked how 'this project will contribute to getting more guests to stay at my hotel'.

Three important lessons were learned from this meeting. The first was that theoretical notions and the approach of transition management are too abstract for most people, especially for those who are interested in concrete and practical short-term results. Although there is always a desire to understand the process and concepts, it is important to put emphasis on the substance and the ideas developed within the transition arena. This is especially true when interacting with stakeholders in the broadest sense. Within the context of the transition arena or in contact with strategic policy makers or strategic actors in general, there is more room for discussion about theory and methodology. A second important lesson was that communication about the ideas developed within the transition arena is a very important topic and necessarily part of transition management. In this case, the transition arena was opened up to the outside world far too soon, thereby almost seriously damaging the project. It seemed clear afterwards that such a meeting should be based on an inspiring substantial story and not on a detailed discussion on the process. This illustrates the need for a communication strategy that is targeted and tailored to specific target groups regarding what message is conveyed to whom at what time. A large number of actors present at this meeting did not see the added value of developing a vision but asked for concrete measures instead and thus expected a fundamentally different presentation.

On with the process, against the current — The meeting with the advisory board seemed rather disastrous at that moment. This made the project leaders very nervous because of the negative publicity and negative impact on public

support for the project. However, it also proved to have a positive influence on the process: the transition arena itself became more committed to develop a tangible vision and concrete plans and at the same time the project leaders also became convinced that the transition arena should be shielded for an extended period from the pressures from the regular policy arena. This opened the way for intensive transition arena meetings during the next half year.

The next meeting was, again, about the problem analysis and the development of a shared conceptualization of the 'system' Parkstad. A general commonality of the problems seemed to be the fact that the organizational level of scale within the region was that of the individual municipalities, although most of the problems identified were present at regional level. In addition, the organizations involved were already active at the regional scale, for example the tourist and health care organizations but also the housing corporation and the media. This had already been signalled in the *Situatieschets*, but had now become a joint perception of the participants. What was then ultimately defined as **a shared problem definition** was that *'Parkstad Limburg (regional level) should be the minimal scale to operate on'*. It was concluded that this would be a good starting point to develop the vision, but that additionally the different sub-themes should be worked out more concretely in smaller working groups including domain experts.

A week after the meeting in which a shared problem definition was found, the transition arena took a bus-tour through the region on a Saturday. Everybody was given a throwaway camera and was asked to take pictures of places and areas (stocks) along the route they found either exemplary for the problems in Parkstad or promising or exemplary for the potential of Parkstad. During the trip, different participants of the transition arena talked to the group about specific sites or characteristics from their own background and experience. Among the subjects were: the mining history, the specific and unique characteristics of the landscape, the plans regarding tourist attractions or the way specific spatial decisions had been taken. The bus trip proved to be very functional in stimulating group building, but also made the problem analysis very concrete and tangible.

Deepening the analysis and paving the way forward — The **themes selected** for the working groups were spatial characteristics, economy, socio-cultural and institutional domains. When the groups met, there was first a general plenary presentation on the latest version of the systems analysis, including the shared problem definition. The general feeling was that part of the information provided was 'common knowledge' and that the level of detail was sometimes insufficient. The overall integrated analysis, however, was received with more enthusiasm and the group felt that a new perspective on what constituted Parkstad Limburg had been developed and levers for change were identified. In general it could be said that participants were motivated to contribute and become part of the growing transition network for the region, while simultaneously being challenged to deepen the analysis and ideas regarding (their) specific themes.

When the discussions were started within the working groups, in which 2 or 3 members of the transition arena participated, the 'systems language' including the rough analytical framework (SCENE) proved to be very useful to provoke discussions, causal reasoning and integrated analysis. The working group sessions

provided more and detailed information, but also showed a growing support for the approach and the overall need for change in Parkstad Limburg. Finally, the groups formulated some basic desires regarding the different themes, which would later on become part of the transition images.

The results of the working group sessions were twofold. In terms of process, the members of the transition arena got motivated to continue participation, even investing more time. They also got the idea that they were in a position to develop ideas that could influence their own specific fields of work. In terms of substance, the working group session gave an idea about the themes to be explored as well as a sense of what the vision would or should include in terms of sustainability conditions. It was clear that the next phase would include a focus on these matters, combined with the scenario-work that was envisaged in the preparation of the project.

The next session therefore shifted the focus of the discussions from the problem analysis to the future. Based on the working group output, two basic scenarios were presented and discussed[32]: 'Parkstad Limburg: caring region' and 'Parkstad Limburg: adventurous region'. The first image put emphasis on small scale development, on social cohesion and regional culture and on sufficient but small-scale economic activities. The latter scenario presented a picture of Parkstad as an international region with a dynamic culture and high-level economic activities. In a sense, these two opposing and in many respects conflicting images presented two different sides of Parkstad in an extreme and stereotypical sense.

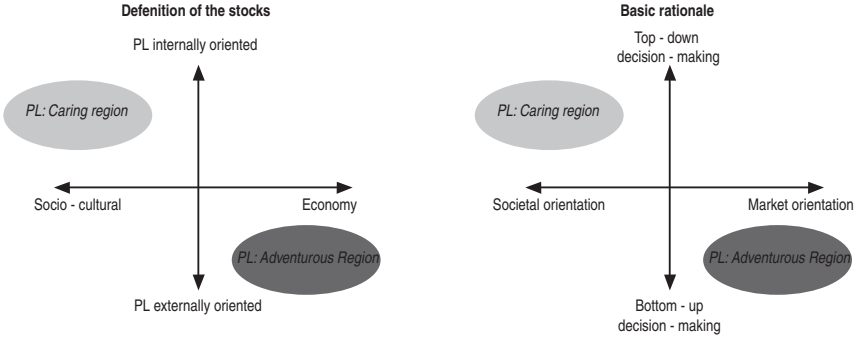


Figure 8.6 Parkstad Limburg scenarios

What consequently happened during the discussion was that different elements of the images, to which new and desired elements were added, became part of an overall vision. Here, scenarios were not used in a strict or regular sense, but mainly to stimulate the discussion in order to be able to identify elements of a transition vision. Within the transition management team, this caused many discussions, since the quotation promised to develop integrated scenarios. While the ICIS team mainly wanted to use scenarios and scenario-related exercises

32 The two scenarios were prepared by ICIS.

Caring Region

- Demographic structure: balanced with an inflow of young people
- Social structure: community feeling, stable social networks
- Safety: safest region in the Netherlands
- Facilities: personal touch / small-scale (welfare, health care and education)
- Housing stock: differentiation of prices, quality and form, housing in balance with and embedded in environment
- Economic structure: health care, services, education, (clean) production industry, recreation combined with culture and education
- Space: public space serves the community, multi-functional space-use

Adventurous Region

- Demographic structure: dynamic, relatively young population, multi-cultural
- Social structure: dynamic, not-overlapping networks
- Safety: at the level of a large city
- Facilities: targeted at 'leisure and pleasure', medical care and education: large scale, specialized, international cooperation
- Housing stock: Differentiation in prices, quality, form, ownership-constructions, flexible
- Economic structure: large-scale and niches (work and culture), entertainment and leisure
- Space: nature and space: functional in the city, public space for leisure, multiple space-use

Box 8.3 The two scenarios for Parkstad Limburg

to stimulate future-oriented thinking (the whole envisioning process was tailored towards this goal), the government officials involved expected concrete documents to be produced and expected a structured methodology and process around the scenario-development. It took a lot of discussion to agree upon a focus on the process and regard scenarios and images as means to support this process rather than as goals in themselves.

8.4.3 Project phase 3: Finally developing the transition vision and agenda (January 2003 – September 2003)

Already a year into the process, the transition arena now finally entered the phase in which full focus was on the future. The next session was based on different provocative statements about the region. Statements such as 'Fresh blood brings new life to Parkstad', 'Parkstad should look outside instead of inward' and 'In Parkstad, culture is carnival, but that's not fun for everyone' were designed to address different aspects of Parkstad and to provoke discussions on these issues. This not only provided more insight into the desired qualities of a future Parkstad, but also brought clarity on what the participants valued and/or found problematic in the present situation. This also offered some starting points for thinking about transition paths later on, in terms of institutional and demographic barriers for specific desired developments.

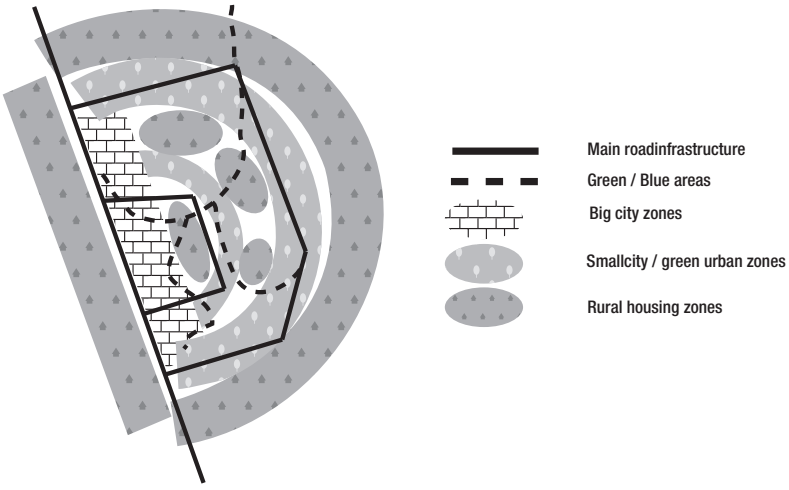


Figure 8.7 Spatial vision for Parkstad Limburg

In terms of process, the transition arena started to express more and more commitment to the process. This was illustrated by remarks of participants: 'we have now proceeded from his or her problem to our problem' and: 'we now have to proceed to the next phase of networking and addressing specific relevant individuals'. The group also coined a label for the vision: *Eigen Wijze Regio*, which literally translates as 'Self-willed region'. The vision would combine the strengths of the region: the cohesion and high quality of living on a local scale combined with an outward looking culture and economy (though not a very modern or ICT-based economy, rather a modern industry). It was decided that a smaller section of the transition arena would work on the vision more intensively before the next meeting of the whole group.

Within the so-called core-group, consisting of the six most committed, inspired and dedicated members of the original transition arena, the overall vision was developed in four very intensive sessions. These sessions were prepared by both the transition management team and the participants by way of drafting documents regarding specific themes, reflecting on discussion documents and making propositions on next steps in the process or themes to be addressed at the meetings. Partly because of the smaller number of participants and partly because of the fast increasing pressure to come up with a coherent vision and concrete recommendations (the project was approaching its deadline during the summer of 2003), the pace of the process was increased.

A number of critical decisions were made during this final phase. One was that the overall vision would be presented in terms of sustainability conditions or 'necessary choices for the region'. In transition terms, these could be interpreted as shared guiding principles. These principles would be translated to different sub-themes for which transition images were to be developed. This meant that no overall scenario or image was developed, but rather a collection of thematic images that, combined with the guiding principles, would sketch the future of

the region. Another decision was that different sub-themes were selected, but these needed to be integral. Examples of these transition themes are economy and knowledge, green areas, cultural passion and recreational diversity.

A very important theme of a slightly different nature, was the theme on spatial development, one of the major problems of Parkstad. Because of the difference in scale between the municipalities and their relatively independent development over the last decades, there had been virtually no coherent spatial planning but only a competition between the different municipalities. This resulted in mobility problems in terms of accessibility but also in a dispersed use of the available space, resulting in fragmentation of the green areas. A regional approach would offer benefits in spatial planning terms, but then it would have to take into account the historical developments, as well as the sensibilities between the different municipalities. The rural areas for example suspected Heerlen and Kerkrade to be looking for ways to expand at the expense of the green areas, while Heerlen and Kerkrade felt negatively about the conservative and sometimes uncooperative attitude of the smaller towns.

In general, it could be said that Parkstad consisted of big urbanized parts (bigger towns of Heerlen and Kerkrade), smaller towns or green urbanized areas (like Landgraaf) and relatively rural villages (Simpelveld, Voerendaal). In the transition arena, it was mentioned that the nine[33] municipalities actually historically consisted of 17 small parishes. These were local communities with strong social ties to the Church and associated facilities like education, social and cultural activities. These parishes had grown into towns and larger communities during the development of the mines in the region and the economic and social activities that this brought along. Based on this notion of local communities as social nuclei, a spatial framework was developed. Geographically, it roughly led to a Parkcity structure with a distinguishable inner-city with a high level of services and facilities, green residential areas with strong local communities and small-scale facilities and in between green and blue 'lungs': areas where recreation, agriculture, and the natural landscape would be conserved and developed.

This framework clearly distinguished between the different levels of scale these 17 parishes currently operated upon and linked them to a specific level of facilities, housing types and mobility and economic infrastructures. It partly built upon the existing levels of scale and facilities but also proposed to develop from here much more systematically. The framework facilitated a differentiation between level of scale and facilities and thus could be used as an aid to structure space, functions and facilities. This meant that in the bigger towns things like the theatre, the football stadium, the highway and the head-offices of the industry should be concentrated. Accordingly in the rural areas, facilities like home-care, local organizations and cultural activities would take place, combined with new functions in the countryside and recreational activities like walking, cycling and camping. Without being prescriptive in a strict sense, this spatial planning idea seemed to gel well with the other guiding principles and would offer a framework within which the future development of the region could materialize.

33 The town of Nuth had temporarily left Parkstad Limburg for governmental reasons and dispute, but was still included in the envisioning process.

The spatial framework seemed to be a breakthrough in the envisioning process. In terms of thinking, it provided a means to achieve a balance between different interests (urban or rural), a coherent structure and future orientation without loss of identity or history and finally a direction for future spatial development, most notably regarding the problematic plans for a new mobility infrastructure. In concrete terms, it also constituted a breakthrough because the involved housing corporation developed a large scale project based on this idea, mapping the region in terms of the parishes and associated functions and identity. This study was the basis for a regional restructuring plan in which the housing corporation and others would restructure housing facilities combined with other socio-economic functions (e.g. health-care, social services, education etc.)

Approaching the end. Or a new beginning? — By the summer of 2003, the outlines of a final document had emerged, though the form, presentation and actual coherence between all elements was by no means obvious. This led to some concerns with the chair of the transition arena and with the commissioning officials whether a presentable end-result that would live up to the expectations, could be achieved. During the summer, the core group together with the transition management team drafted the final document, which was finally called "Op Hete Kolen" (a Dutch saying that means 'like a cat on hot bricks'; '*Kolen*' (lit. coals) refers to the mining history of the region).

The final document thus contained all the elements of the transition arena process; the problem analysis and definition, the shared guiding principles, the selected sub-themes and their transition images. It also identified transition experiments and projects possible within the sub-themes (see Box 8.4 below). The whole document was reflected upon by the transition arena and finalized by the end of August 2003, some 1.5 years after the beginning of the project. It included specific ideas that had been further developed by individual members of the transition arena. Examples of such proposals are collaboration between higher education and local industries in education and training focused on entrepreneurial and industrial activities (*Ondernemerschaps Gericht Onderwijs, OGO*) and identifying the 17 parishes and their specific spatial and housing characteristics. Both these projects had already been started before the official presentation of the vision document. Other examples of ideas were a regional socio-economic council, international cooperation with Aachen region, more emphasis on Parkstad Limburg in external communication, joint marketing of tourist venues in the region and a plan to develop a coherent green-structure.

The transition vision and transition agenda for Parkstad Limburg were presented by DeWulf before the daily board of Parkstad Limburg, mayors Sakkers and Som and other officials involved in the region. The reactions were positive and the people expressed their agreement with most of the analysis as well as the necessary choices identified. This marked the formal end of the project, but it was clear both through the text and the way it was presented and communicated by individual members of the transition arena, that the process of transition and the operationalization of the transition vision and -agenda were not. It was agreed that the different working groups on the specific sub-themes would continue their work to specify the plans in more detail and come up with additional actions for the region. By the end of that year, this would culminate in the final

vision document which was presented to the public on behalf of the transition arena and the project leaders.

Integrated Problem analysis

- Environmental (pollution air/water/ground, spatial coherence…),
- Social (employment levels, education levels, ageing population…)
- Economic (low incomes, underused knowledge structure, low attractiveness for business)
- Institutional (no cooperation, pro-active lobby)

Shared problem definition

- Parkstad Limburg (regional level) is the minimal scale to operate on
- Operating on this level necessitates a shared perspective and shared action
- There is a high sense of urgency, despite the institutional fragmentation, to act quickly to deal with the major problems facing the region

Future vision: five necessary choices (basic shared principles)

- Natural landscape and qualities leading in spatial planning and regional development
- From fragmentation to coherence
- Unity through diversity
- Integral (triple) sustainability
- From introvert to extravert thinking and acting

6 opportunities (transition images and paths)

- Brain economy and active knowledge
- Green areas revitalized
- Care for welfare
- Recreational diversity
- Cultural passion
- Regionalization
- Space for Parkstad (spatial planning concept)

A short term agenda (linked to the 6 themes)

- Local profiles (17 'stadsdelen')
- Cooperation (housing and health care organizations)
- Cooperation education/knowledge institutes and local/regional business
- Development of thematic plans, visions and networks (tourism, rural areas, culture)
- Coalitions in healthcare, education, tourism
- Media attention, TV-series

Box 8.4 Key elements of the Parkstad Limburg Vision 'Op Hete Kolen'

8.5 Evaluation

8.5.1 Role of the research team

At this stage it is important to explain that the start of the project coincided with various other activities relating to developing and implementing transition management, which was still in its infancy stage. I myself had been involved in the project since the development stage of the project proposal (early 2002). The project presented a very good opportunity to explore theoretical new grounds and experiment with the approach in practice as well. The start of the project coincided with intense discussions that Jan Rotmans and myself were involved in with the various NMP4-ministries. These discussions were about the implementation of the NMP4 where there was as yet no clear methodology to implement the basic principles underlying transition management as defined by (Rotmans et al. 2000).

It is important to mention here in particular one meeting in which a debate about transition management was organized between the ministries and Jan Rotmans. The basic principles for transition management as described in (Rotmans et al. 2000), were rather abstract and the ministries found them hard to operationalize. Rotmans defended the approach, although he also had to admit the theory was still in its infancy and there were as yet no clear answers. The ministries asked for a more detailed process design, preferably a step-by-step (we called it 'blueprint') approach. Although this was contrary to transitions-thinking, it was clear that without such an approach, transition management would be very difficult to pursue. On the train journey back from The Hague to Maastricht, Jan Rotmans and I evaluated the meeting and re-discussed some of the issues. One of them was that transition management would only succeed in a somewhat protected environment (analogous to what the transitions concept indicates). Inspired by some remarks about this in the meeting (about a policy-arena) we came up with a new term: **transition arena**.

Within days after this meeting, Jan Rotmans had summarized the activities we combined in transition management in ten 'steps' (see Figure 8.4). These ten steps were visualized in a cycle to emphasize the non-linearity of the process and published in (Dirven et al. 2002), but still based on a somewhat linear idea of a transition management process. For example, we thought it possible to start up a multi-actor process before developing visions and we thought it would be necessary only later on in the process to define and discuss necessary instruments and means for policy. Such ideas, and others, were only possible to put to the test in practice and based on this refined. Later on, also because of our reluctance to develop blueprint designs for a searching and learning process, Jan Rotmans and I clustered the activities into four basic types of activities. This cyclical representation of transition management ultimately evolved into Figure 5.2 in Chapter 5. The writing of the (Dirven et al. 2002) publication,[34] the discussion with the ministries and the development of the process design for Parkstad

34 I was involved intensively in the discussions between Jan Dirven, senior policy maker at the Ministry of Agriculture, Nature Conservation and Fisheries (LNV) and Jan Rotmans about merging his concept of agenda-building with transition management. This difficult process was resolved by positioning agenda-building as part of transition management, which was presented as a generic and still some-

Limburg all coincided so that the development of the first operational model for transition management gained momentum. It was during this process that the initial ideas on transition management as summarized in the ten-step cycle, were actually refined, given meaning and linked to operational tools and methods.

As ICIS-researchers, Martin van de Lindt, Jan Rotmans and myself were actively involved in the whole Parkstad Limburg project, in different roles. We were involved as researchers (performing integrated assessments, providing the arena with continuous updates of enriched assessments and additional information, developing further the concept and method of transition management), as participants (in the discussions, in suggesting ideas) and as project managers (co-deciding on project structure and management, on communication). In our role as researchers, we had both a 'classical' role as performing integrated assessments and a 'modern' role as action researchers in co-producing knowledge with the stakeholders involved. In this section we try to reflect on our own role in and influence on the process. A focus thereby is on the way we influenced the process based on scientific arguments and conceptualizations. This is relevant in order to identify the considerations behind specific choices in the process and to be able to explain the development and outcomes of the process.

In general, the ICIS-team influenced the project on two levels. ICIS not only structured, organized and facilitated the process, but also structured, integrated and proposed substance.

In terms of process, there were different decisive moments on which ICIS had to take decisions. Key decisions were to:

- start with a select number of actors in the transition arena
- spend an extensive amount of time on problem structuring and envisioning rather than on developing concrete project plans
- take the systems approach as a starting point
- invest in developing a joint systems language
- keep the 'regime' as much as possible at a distance
- keep the advisory board and daily board at a distance
- focus on the frontrunners within the arena and to work with different sub-groups with different paces within the arena
- finalize the report with a core-group instead of the whole transition arena
- work out the different sub-themes in working groups.

In terms of substance we had to adjust and direct discussions a number of times as well. Key moments were:

- The decision to develop one overall vision and one transition image rather than a variety of transition images
- The decision to pursue with the systems approach and language in spite of the resistance in the beginning of the project (too abstract, theoretical)
- The integration of various themes through using the systems approach
- To discuss the problems first at the systems level and later at the thematic level

---

what abstract model for governance *(the fact that transition management was the main topic and not agenda-building might also have had something to do with the order of the authors).*

- The focus on system structuring and a problem definition at that level
- The identification of the shared guiding principles based on various transition arena-discussions
- The stimulation of vision discussions by providing various input (images, examples, propositions and such)
- The selection and labelling of the different sub-themes
- The writing of the final document, including integration of existing vision-elements.

In essence we could say that, although the transition arena produced numerous ideas, questions and proposals, it would have been impossible to achieve the final outcome without the influence of the ICIS team, or that at least the end-results would have been fundamentally different. This leads to questions regarding the claim underlying transition management, that a transition arena should produce a vision and how the role of ICIS in this should be interpreted. In this project it seemed that individual participants although had the necessary knowledge, network and capabilities (for which they are selected), they still lacked time, overview and experience with systems thinking to quickly aggregate, integrate and coordinate process and substance. It seemed that just because of the interaction between transition management experts and individual experts from the field something new emerged, which the participants felt to be their own product (since they presented it publicly under their names without mentioning ICIS). The influence of ICIS on the project, however, also reached beyond the transition arena itself to the project management and even the regular policy environment.

8.5.2 Project management and 'transitionizing' a regular policy context

The **time spent** on the project by the transition management team was ultimately more than double the amount of time envisaged at the beginning. Besides the 11 meetings of the transition arena, there were all sorts of other meetings, time was spent on preparation of the meetings, on discussion papers, on reports of the meetings and on drafting documents. The transition management team, mainly Vonk and Kleynen and Van de Lindt and Loorbach (sometimes with Jan Rotmans) met 37 times formally between January 2002 and December 2003 and an additional number of times informally. There was additional regular communication via email (some 250+ were exchanged) and telephone. For the project, 980 hours were billed in total according to the quotation and the extra budget for finishing the final report. The actual amount spent though was approximately 2000 hours, not counting the general methodological, scientific and theoretical discussions regarding transition management within ICIS. Part of the explanation for this large amount of extra time that had to be invested is, that during the project new concepts and ideas had to be developed. Moreover, a considerable amount of time was spent on explaining the theory of transitions and transition management. But most of the time perhaps was invested in making progress with the process: searching, adapting, convincing, negotiating, adjusting, confronting etc.

The project itself was in general characterized by highly non-linear and chaotic processes, uncertainties, doubts, intense debate and substantial tensions. Within the transition management team, but also in contact with other govern-

ment officials, bureau Parkstad Limburg and the advisory board, there was a constant battle to transfer the transition management approach, gain support for next steps to be taken and create a consensus on things like input and facilitation for an arena-session. The description of the process in the previous section might suggest a certain linear and smooth development, but actually the project was close to cancellation a number of times. In addition, the outcomes in terms of substance and process were under constant debate: whether the outcome would be a formal spatial plan or a transition vision, would be a set of detailed scenarios or general images, would be only a long-term plan or also a concrete action agenda, etc. The definition for instance of what a vision should include and more specifically what this implies in the case of Parkstad Limburg, was not yet fixed but had to be developed during the process.

It seems that such a diffuse, cumbersome process full of tensions is at the heart of facilitating and organizing a transition arena. In any context, a group of outsiders developing innovative visions for a larger community will be subject to criticism, scepsis and doubt. Besides posing a possible threat to existing structures and powers, the transition arena also allows for a form of elitist and innovative process that is not always understood. There will thus always have to be spent a lot of time on explaining the process, persuading opposition or those who are doubtful, reacting to external changes and counter-productive activities. In this sense the transition management team can function as a pivot between the transition arena and the regular policy context. This aspect of the role of transition management experts in a transition management team cannot be too highly valued.

A good example of this was the uncertainty and doubt of the government officials regarding the necessity of investing time in the problem definition and the system analysis. They did not see the added value and felt that it took too long and was not productive in terms of output to be presented in the regular policy arena. Participants and project leaders were continually asking for reflection on what the day-to-day process meant in terms of transitions and how the next steps that were suggested reflected transition management. For example, how and when transition scenarios would be developed or how the different working groups and transition teams fitted within the concept of the transition arena.

Another illustration of the type of discussions that took place within the transition management team was the situation around the organization of the first advisory board meeting which was formally scheduled in the process design. The process at that time had not evolved as rapidly as foreseen and the ICIS team felt that not enough material was available to present. The government officials felt that expectations had been raised and, as the meeting had already been scheduled, cancellation would be even more problematic. The ICIS team then reluctantly agreed to present the methodology, but wanted to focus on discussing the problem definition. Though the meeting itself was not very constructive and in some sense even a crisis, it did however create room to proceed based on transition management.

It seems that the general recurring tension within such a project is between the pressure to deliver concrete results (products) that are valued in the formal policy environment (a document, recommendations, project proposals), and the drive to generate self-governing and innovative processes (reframing, co-creation, spontaneous action, social learning). In the regular policy arena the prod-

ucts are seen as goals in themselves and are therefore often produced without any link to follow-up or a broader societal process in general. In transition management, the products are seen purely as means and thus flexible and adaptive to the context of an evolving process. This implies that process plans that were agreed on, can evolve and change during the process and that the products can be redefined according to their role in the process. This is a totally different way of thinking which many government officials and bureaucrats have a hard time to get accustomed to.

The critical and questioning approach of the government officials was sometimes difficult since the project was basically a searching and learning process, applying relatively immature concepts and ideas as the process evolved. Every time we came up with something new, more questions were asked demanding further explanation and clarification. This is illustrated by a quote from a mail Martin van de Lindt (May 8, 2002) sent to the ICIS colleagues involved, reacting to a question regarding the methodology:

> 'The danger is that they (e.g. the government officials, DL) got their hands on something new again, namely the ten-step approach and that they want to follow this step-by-step, while in fact it is a more ideal-typical process, that needs to be tailored towards 'local' circumstances'

Although through these discussions we were pushed to develop and refine the methodology, the government officials in the transition management team also slowed down the process and required a much larger effort in terms of time and input than foreseen. However, it led to continual adjustment and refinement of process and substance and an evolving methodology. In these terms, both for the government officials as well as for the researchers involved, the project was a result of learning-by-doing. During the Parkstad envisioning process, all participants began to understand and became acquainted with thinking in terms of systems and transitions. This in practice led to the development of a shared language providing a basis for structured and constructive dialogue. It was found that such a common frame of reference and language in such processes needs to evolve bottom-up rather than via unidirectional transfer of theoretical notions and concepts. This underlines the importance of subtle and intelligent process facilitation and –organization that is based on a thorough knowledge of transition management and of the transition issue within the transition management team.

One of the main lessons that came out of this project though, was the importance of understanding the context in which such a process takes place, i.e. the regular policy arena. This was especially the case in this project because a 'classical' planning process had to be transformed into a transition management process. Since transition management starts from a fundamentally different paradigm than underlying regular or formal policies, but always in a context of these regular policies, 'reframing' or a mental switch is needed from government officials and participants involved. Although this 'transitionizing' of a regular policy context and actors from the regular policy arena is time-consuming and even tiring, it is also an almost necessary precondition for later diffusion of the approach and ideas developed and therefore worthwhile. In the case of Parkstad Limburg the time and energy invested in these activities not only was successful at an individual level but also produced significant results (see next paragraph).

8.5.3 Impact of the project

It is clear that transition management's ambitions are to have an impact on society at large and not only produce meaningful results within the context of a structured and facilitated process (the transition arena). Since its governance philosophy is that of indirect influence and self-governance, the impact of transition management is by definition hard to formulate in quantitative terms. A complicating factor in measuring the influence of transition management is the fact that it partly builds on existing initiatives and activities, and that actors involved are basically motivated and guided to adapt these activities to shared and long-term goals and to integrate the activities into wider innovation programmes. The fact for example that an individual decides to undertake a specific action also mentioned in a transition agenda, may be as much the result of that individual's will as the outcome of the learning process he has gone through in a transition arena. A final complicating factor is that the desired changes based on reframing of actors involved, is a long-term evolutionary process from which concrete changes only become visible over time. In the case of Parkstad Limburg, however, it can easily be shown that the project had a profound impact on a number of societal domains and that it influenced and redirected not only the economic and institutional but also the socio-cultural development of the region. Because it is impossible to include all direct and indirect effects of the process, we will give an overview of the main results in terms of societal impact.

A key player in the presentation and final success of the project was the chair Chris DeWulf. Because of his prominent position in regional policy and business networks, he was in a position to present ideas, involve strategic partners and stimulate the debate on the future of the region while the project was running. In this way he was able to create links between regime (-actors) and niche (-actors), to influence decision-makers and stimulate new initiatives. For the transition arena he was very important in that he created and maintained the necessary room for the process by keeping the policy-regime at bay and expressing his confidence in the process to the outside world (although he sometimes had serious doubts behind closed doors).

The most pregnant result of the project was the decision of the municipalities to start the process to formally become one region. In fact this had been perceived to be one of the main barriers beforehand (and in the Situatieschets). In November 2005, the cooperating municipalities agreed upon the so-called Wgr+ regulation (*Wet gemeenschappelijke regelingen*, law on joint regulations) which basically meant the transfer of authorities from municipal to regional level. The consensus that was reached and the argumentation behind the agreement were explicitly based on the problem analysis and recommendations from the final report.

> 'Mid 2004, a group of representatives from the world of business, semi-public and intermediary organizations presented their vision on the region in the document: *Op Hete Kolen*. The signal was clear: there is a high sense of urgency for Parkstad Limburg to act: the spatial structure is weakened, the image is negative and the population is ageing. On Hot Coals states that we, the local government, need to take action: make choices, support the economy and strengthen local government and. (…) The Parkstad Limburg council has taken up this challenge. In the first place by further streamlining the regional agenda (…). The conclusions of this report, however, do not only have an impact on

the substance of the regional agenda. Institutional arrangements need to be strengthened as well. This will be achieved along two lines: the Wgr+ and a strategic alliance with the Province.' ((Parkstad-Limburg 2005, translation DL)

(*Medio 2004 heeft een groep vertegenwoordigers uit bedrijfsleven, semi-publieke en intermediaire organisaties haar visie op de regio gepresenteerd in de uitgave 'Op hete kolen'. Het signaal was duidelijk: het is "vijf voor twaalf" in Parkstad, de structuur van het gebied verzwakt, het imago is bepaald negatief en de vergrijzing slaat toe. Tref maatregelen zegt 'Op hete Kolen' in de richting van de lokale overheid: maak keuzes in economie, versterk het publiek bestuur. (…) Het bestuur van Parkstad heeft de handschoen die haar op deze manier is toegeworpen, opgepakt. In de eerste plaats door een verdere indikking van de regionale agenda (…). De conclusies van het rapport hebben echter niet alleen betrekking op een inhoudelijk programmatische aanpak. Ook bestuurlijk dienen de krachten gebundeld te worden. Dit gebeurt langs twee lijnen: de Wgr-plus en een strategische alliantie met de provincie.)*

Moreover, the regional policy agenda was thus also influenced by the transition vision in the sense that themes were redefined and other priorities were set. It was presented as a milestone for the future development of the region and was described in the regional newspaper the next day under the headline: 'Massive support for Parkstad+' (136 aldermen for and 5 against). The article opened saying that ' Forty years after the announcement of the closing of the mines by Joop den Uyl (*then PM*, DL) the municipalities of the former mining area decided to go beyond the usual cooperation.' (Limburgs Dagblad 16-11-05, translation DL) (*Veertig jaar na de aankondiging van de mijnsluiting door Joop den Uyl besloten de gemeenten van de voormalige Oostelijke Mijnstreek om verder te gaan dan de gebruikelijke samenwerking*).

The following future spatial plan developed by the council literally based itself on *Op Hete Kolen* and proposed very similar guiding principles, necessary choices and transition paths (see: Stipo-Consult 2005). Another concrete result was the spatial study commissioned by the housing corporation involved, which was explicitly based on the spatial structuring framework part of the transition vision. The basic idea is used as guiding principle for the development and restructuring of the urban areas. This was initiated by the director of the housing corporation involved in the transition arena who provided the basis for the regional housing-vision 'At home in Parkstad Limburg'. The vision was developed and supported by the Parkstad municipalities and the three major housing corporations in the region. Part of the vision is the development of local housing areas (*woonmilieus*) such as 'social castles', 'mining colonies' and 'hill-homes'. The regional newspaper wrote the day after presentation: 'The housing vision is part of the Parkstad vision 'On hot coals' that was presented by the end of last year. In this vision, Parkstad strongly expresses the will to develop a better living and housing environment.' (18-06-04).[35]

35 See for a Dutch description and images: http://www.kei-centrum.nl/view.cfm?page_id=1897&item_type=project&item_id=205

The idea of OGO (entrepreneurial-based education) that came out of the transition arena was followed up in terms of the development of a concrete coalition between education institutions and SME's in the regional and actual educational programmes with integrated internships. Two initiators of these programmes were members of the transition arena. In the field of tourism and recreation, much more emphasis was put on regional profiling (shared marketing of tourist attractions, regional offers including accommodation, bike-rental and recreation) and much more attention has been paid to the EU-regional context. A driving force in this process has been the director of the regional tourist office who was also a member of the transition arena. Another transition arena member that has voiced his opinion in public debate was the director of the Parkstad Limburg theatre. He has made a strong argument for coherent cultural policy, and has personally taken various initiatives to stimulate and accommodate regional culture.

On a more general level, it seems that the individuals involved in both the transition arena and the process that evolved around the transition arena (the meetings with the advisory board, the working groups and the external presentations), also stimulated the public debate and the general perception of the region. A growing number of actors seem to be convinced not only of the urgency to act but also of possible opportunities to turn the region around. The negative and self-pitying way of thinking seems to be abandoned by a growing number of actors. Some quotes from individuals show this: 'We shouldn't depress ourselves because the processing industry is leaving the region. It changes, and we have to change with it' (*We moeten ons niet het graf in praten door te roepen dat de maakindustrie vertrekt. Die verandert. En wij moeten mee veranderen*) and 'the strength of a region in flux is the opportunity to start something completely new' (*De kracht van een onthechte regio is dat je iets totaal nieuw kunt beginnen*) (Limburgs-Dagblad 16-12-05, translation DL).

Two other developments support the assumption that a change in perception is taking place. The first is the choice for sustainable energy as a priority. Parkstad has formulated very high ambitions in this area and wants to integrate sustainable energy businesses with the history of the region and future economic and social developments. Guts, a consistent policy and funds are needed to implement these plans, and it has been a long time since such high ambitions were voiced by regional government (Limburger 27-08-2004). A nice initiative in this area is sustainable energy from heated water in former mines, which creates a link between regional history and the future. The second development is a new élan in spatial and architectural development based on a more profound awareness of the region's historical development and current problems which need proactive strategies rather than defensive ones. In a newspaper article titled 'Close to the Renaissance', prominent citizens of Parkstad argued for more innovation and guts and a 'shock' to the self-image and profile of the region (Dohmen 13-05-06). The article clearly explains the complex regional history and its persistent problems, along with a plea for cultural change.

Concrete follow-up activities were (and still are) also taken up in a structured way by the Parkstad Limburg Development Organization (PLDO; http://www.ontwikkelingsmaatschappij-parkstad.nl). This organization already existed previous to the envisioning project but was unable to find either a coherent strategic agenda or a legitimate mandate to act. Already during the envisioning

process, a number of actors involved in the transition arena/advisory board and the PLDO started to integrate the transition agenda with their own operations. The transition vision since then became a guideline for their operations (literally they say: *guideline for our operations is On Hot Coals*). Examples of concrete activities they have since undertaken, based on the transition agenda, are an image campaign (targeted at Parkstad Limburg residents to create awareness of the regional profile, history and future), a co-siting project for regional SME's (Corio Bazar), Care-services market (development of diversified services in health care), Parkstad Popcity (creating regional music/cultural infrastructure) and the project 'Parkstad's third age' (creating awareness about ageing population and formulating 250 concrete actions). In a sense, the PLDO has taken over the role of the transition arena as a societal platform for innovative ideas and action based on shared long-term goals.

In conclusion, we can say that a final evaluation of the impact of the envisioning project shows an overall impact that clearly outreaches the project. Although it is difficult to fully 'claim' the above-mentioned results, it is clear that the project had an impact on individuals, networks and institutions in the region and led to follow-up activities and action. In that sense the project can be seen as a major success and as a strong case for the use of transition management in such a context. However, the follow-up process as well as the actual project could have benefited even more by allowing for more time, energy and money to be invested. In future transition arena projects it seems advisable to reserve substantial time and money for activities besides the core arena-process. In the case of Parkstad Limburg, a start was made to organize follow-up strategy sessions based on the defined transition paths and working groups (in the vision), but this was not followed-up due to personnel changes within the government organization. The feeling is that this could have led to even better diffusion of ideas, involvement of even more actors and implementation of a larger number of concrete projects.

8.6 Lessons learned regarding transition management[36]

It has become clear that the Parkstad Limburg project was not only a process of vision development, but also a methodological and theoretical journey; it was a real-life experiment, an experimental garden. Very much in line with the idea of transitions as emergent and uncertain processes, this project had all the characteristics of a complex, participatory policy-supportive process. Through the project lessons about how to develop a process of sustainable development were learned that were very context specific. An example is that of the 'keukentafelgesprekken' (*kitchen-table conversations*) that emerged as a useful way to gain the trust and support of relevant individuals in the region. The regional policy culture is based on informal rather than formal networking. The *keukentafelgesprekken* proved a valuable way of involving stakeholders and gathering relevant information within this context. Besides such specific insights, the ma-

36 This section only describes the lessons, they are worked out in detail in Chapter 4, Chapter 5 and especially Chapter 6.

jority of the lessons learned seem valuable in any context and can be formulated generically.

The project as a whole showed that the basic principles underlying transition management as a form of participatory policy-making based on complex systems thinking, were valid as well as useful: on the one hand rough outlines, frameworks and concepts that provide structure and on the other hand day-to-day processes with high levels of chaos, surprise and uncertainty. Managing such processes requires specific knowledge, competences and experience as well as affinity, experience and commitment to cumbersome processes that often seem directionless or unproductive. These competences relate to 'managing' the participatory process as well as to 'transitionizing' the regular policy context (i.e. those actors involved in funding, co-organizing and facilitating the process). It is important to distinguish between these two roles since they require quite different competences and skills.

For managing the transition arena, key skills and competences are:
- Communicative and presentation skills
- Knowledge of transition management theory
- Experience with complex process management
- Knowledge of (process-)tools and instruments
- Knowledge of participatory methods
- The ability to iterate between abstract and concrete, generic and context-specific
- Capability of integrated analysis and abstract thinking
- Creativity and flexibility

For 'transitionizing' a regular policy context and actors from the regular policy arena, these are:
- Strategic insight into policy processes and the logic hereof
- The ability to persuade and convince based on arguments
- Sustain trust in an emergent and unpredictable process
- The ability to defend and explain transition management in a regular policy context
- The ability to create trust and confidence in the process
- The ability to invest time and energy besides the actual 'project'[37]

It seems clear that a combination of these skills and competences implies a profile much different from that of a regular process manager, a facilitator or researcher. What is looked for in transition management (action) researchers, is a combination of the different elements that enable them to structure process and substance, while simultaneously explaining and conveying this process and substance to the outside environment in such way that they diffuse and become adopted. The inverse of this statement is that a process manager will not be able

37 In formal terms, 'transitionizing' is never part of a transition management project in terms of budget or time reserved because they are always formulated around a transition arena and the (envisioning-) process. The transition management team should thus be able to invest extra time, bargain for larger budgets or be able to gain support before devoting attention to transitionizing.

to manage a transition arena effectively because of his or her lack of knowledge and skill concerning transitions and systems thinking and his or her lack of attention for the context of the process. For pure researchers, it will also be impossible to facilitate and organize a participatory process effectively.

With hindsight, it thus proved to be possible to influence and even guide the transition arena process, though not in a classical, top-down manner. 'Steering' in this context meant influencing, creating space for new ideas, creating circumstances, providing information or access to new ideas, making new network-connections, communicating at different levels (from strategic to tactical and backwards) and thinking through and analyzing the output of the transition arena. Through intensive interaction between all participants involved, a continuous reflection on progress made both in terms of substance and process and critical but supportive representatives from government in the transition management team, this form of steering in a sense emerged. Some major lessons learned in this project provide an important empirical and theoretical underpinning of the transition arena model (Chapter 6), in terms of facilitation, organization and methodology. These lessons also led to the deepening of the transition management theory in various ways. Most notably it led and contributed to the development and refinement of the transition management framework and cycle as presented in Chapter 5.

8.6.1 Theoretical lessons regarding transition management

A huge amount of theoretical and methodological insights resulted from the project. Sometimes these provided new insights that led to further theoretical refinement, and sometimes these lessons provided valuable empirical evidence for initial theoretical assumptions. Without being complete, ten theoretical lessons seem to have a generic value for transition management in practice:

1 Every transition project is unique in terms of context and participants and therefore requires a specific contextual and participatory approach. This means that there is no such thing as a standard recipe for how to manage transition projects.
2 Substance and process are intertwined and cannot be separated. This requires a flexible and creative process management that is based on analysis.
3 Facilitation and organization of a transition arena should be in the hands of a team in which different types of skill, institutional background and knowledge are combined
4 Thorough knowledge of transition concepts and systems thinking is essential for facilitating and guiding transition arenas, but facilitating this process is different from guiding it (guidance needs knowledge authority while facilitation requires independence and distance to the substance).
5 Too much attention to the theory behind the process complicates it but is necessary in the context of policy-makers and project leaders. Within the transition arena, focus should be on the substance and discussions structured according to the transition and transition management approach.
6 A relatively safe and free environment like a transition arena stimulates the development of creative, innovative ideas.
7 The process of social learning within a transition arena is aimed at changing the mindset of participants with regard to the persistent problem in question, which is a difficult, time-consuming process, in which the use of an integrated

systems approach is a helpful aid. Participants internalize what they learn quite fast without often realizing what they have learned. It depends on the context to what amount they learn in terms of adjusting their own way of thinking and acting.

8 The chair of the transition arena is very important as an ambassador of the transition arena. For this he should have social stature and influence and be able to create and maintain the innovation room for the transition arena, as well as have the expertise to communicate and present ideas attractively.

9 The facilitating transition team will be required to do most of the work in writing texts, formulating key arguments and basic principles and providing input for discussion. The transition arena members need to devote as much as possible on interaction with each other, reflection on emerging documents and transfer of the ideas developed.

10 There should be ample room for unforeseen events, activities and products and enough time and energy to invest. Transition arenas, if organized effectively, are the start of an evolving and expanding process, which needs to be acknowledged beforehand so that additional means and personnel can be involved later on.

Experiences with this project and others such as the energy transition process, the research on the waste transition and the Flemish Sustainable Living transition arena, formed the basis for the development of the transition management cycle and the multi-level framework. As mentioned before, the transition management cycle was partly during the course of the project and partly based on the existing pre-concept as described in the first publications. During the project, it was refined and later on linked to the multi-level concept (see Chapter 5). The multi-level framework for transition management (see Chapter 5) came partly out of the experience that the vision development in the transition arena is something different from concrete discussions on sub-systems (thematic) and transition paths. Another finding was that these different processes required the involvement of different types of actors with different roles and competences. At the envisioning level, individuals with strategic skills and expertise, capacity of systems thinking and communicative and leadership skills are important. At the level of agendas and coalitions, stakeholder (*polder*-) processes could take place between representatives from stake-holding companies or organizations, but always based on the overall transition vision and within the conditions set for sustainable development. Ultimately of course, the transition images and agenda developed here, (later to be called transition paths), should lead to concrete projects. Based on this I formulated the multi-level framework of strategic, tactical and operational transition management, linking the different levels to the different phases of the transition management cycle. This also opened the way to structure selection of actors, tools and instruments in different phases and at different levels (see Chapter 5 for extensive description of the framework and cycle).

8.6.2 Methodological lessons[38]

A number of lessons were learned concerning the methodology for transition management methodology (in this thesis presented in Chapter 6). A first one concerned the definition and 'meaning' of the elements of the transition management cycle.

- **Transition arena**: creating space for the innovation process is very important (by calling it transition arena, by keeping away short term concerns and demands, by defending the amount of time needed to invest, to etc.). The transition arena approach in itself is an instrument for governance and needs to be underpinned with theory, models and process structure. In this context a very important, and so far underdeveloped, issue is the management of the relationship between the transition arena and regular policies. This project illustrated both the possibilities for influencing regular policy through transition arenas and the limitations of developing transition visions and agendas that ultimately need to be accepted by regular policy. Here, the tension between theory and practice seems to underline the innovative capacity of the transition arena and the need for additional methodology to manage the 'interface'.
- **Integrated systems analysis**: used for exchange of perspectives and problem definition. It provides a framework for integrated analysis at a systems level and bridges different perspectives and values of participants. It helps to stimulate input from participants.
- **Shared problem perception**: an essential precondition for participants to agree on collective action and goal-searching. The problem structuring process itself also functions to develop shared images of reality and a language to talk about this reality (discourse)
- **Vision**: shared principles and target images/themes (instead of one overall image), basic elements (problem analysis, problem definition, shared principles, images/pathways, actions). The process of developing and thinking through the elements of the vision is more important than the output itself, since the process is a form of social learning and is designed to lead to reframing (changes in mindset) of participants
- **Transition working groups**: Sub-groups on sub-themes to broaden network (tactical level) are an important way to expand the transition-network step by step and simultaneously to transfer knowledge and ideas developed. This way, the vision is transferred, made concrete and internalized on a larger scale as a basis for following concrete experiments and action
- **Scenarios**: in general scenario-methods and tools can be used to stimulate future-oriented thinking, but can best be used flexibly and for inspiration rather than for prediction of development of concrete plans.

Selection of participants — In retrospect, it worked very well to start with inviting a relatively large group of relevant actors (relevant in the sense of being employed, important, outspoken or active in the specific system or on the specific topic). From such a group, only a part will be willing and enthusiastic to invest time and energy on a regular basis or be interested in an envisioning proc-

38 These lessons are touched upon briefly here, but are explained at length in Chapter 6.

ess. From this list, around 15 people can be selected (the transition arena), based on representation (of different actor-groups), innovative ambition, network and strategic capability. Throughout the process this group will self-organize and self-select those of the group that have truly internalized the vision and process and are able to translate the ideas to their own daily context (and make use of it). Beforehand, it is impossible to envisage who these people will be, in particular because of the emergent character of the vision and process. The organization and facilitation should thus be focused on developing the group, internalisation of the ideas developed and stimulation of individual contributions from the participants to the strategy.

Organization and structuration of the process — Innovation and innovative processes such as transition management need to deal with the context of regular and short-term policies, if only because finances often come from this arena. The short-term concerns of politicians and government officials, lead to a constant focus on products produced instead of the process being developed. In addition there is also a claim to be involved and to be able to influence the process. It is clear that some funding agency or organization should be involved and that a transition management team should include representatives from the initiating institution as well as from transition management experts. In this transition management team, transition management is made context specific in a continuous process of discussion, negotiation and debate which in itself already leads to a transfer of transition management ideas to the institutional representatives. In short, the discussions in the transition management team will reflect the more general tensions there are between the regular policies and their logic of action and the transition management approach. During a transition management process there are continuous tensions between the regular policy process and the transition arena, which infrequently reach such a high level that they need to be decreased (this requires a sensible communication strategy).

Process facilitation — The progress in terms of the network building process and the development of a shared overall vision were closely related. In practice, this has meant that organizing the process (selection of methods, topics for discussion and structuration of the discussion) was only possible based on thorough knowledge of the methodology and transition (management) concepts. Facilitating processes for sustainable development therefore requires not only process skill, but certainly also methodological competences, creative and flexible capabilities and last but not least faith in the process.

Because of the innovative and complex nature of the transition management process, it is impossible to predict outcomes. However, by following the different steps in transition management (constantly adapted to the specific circumstances and context), the chances that shared problem definitions and visions and ultimately changed behaviour and new forms of cooperation emerge are greatly enhanced. Contrary to regular policy processes which are very much product-focused, the process-focus of transition management is more risky but certainly potentially more productive. Classic process facilitation, however, is mainly concerned with delivering products in time, often neglecting the fact that the participants did not internalize the ideas and developed a new personal frame of action.

8.7 Conclusions

The Parkstad Limburg envisioning project was, in many ways, a unique project. It was the first actual transition management project in which a theory and method of transition management were developed. More importantly perhaps, the project achieved something that, though often tried, had not been realized until then: a shared sense of urgency felt by relevant actors in the region and a change in thinking, from reactive to more proactive. This change has not only led to numerous individual activities, but also to cooperation and institutional change at a collective level. The societal and explorative approach underlying transition management has thus constituted a unique process and results. As a case for transition management this project has therefore been more than successful in terms of further theory and concept development, as well as in terms of achieving concrete results that differ from what can regularly be expected. In that sense a process has started that has become irreversible and has become part of the regular structures and institutions.

We should, however, be modest in claiming success, let alone suggest that a full transition of the region has been successfully initiated. The project has had an impact on a limited number of individuals and activities when compared to Parkstad Limburg as a whole. Counter-forces opposing the development as foreseen in the vision are still operating and alternative strategies and developments are vying with each other. The problems previously indicated, have not suddenly vanished, which remains a reason for negativism and lack of initiative. The faith in the future of the region has maybe returned amongst a group of, important, individuals, but the general feeling is still that of distrust and negative expectations. It is however promising that a broader awareness seem to have emerged in the region, partly stimulated by this project, around the unique position and profile of the region including its specific problems and opportunities. In this context a lobby has started by a broad coalition of regional actors to attain an experimental-status from national government and therewith more funds, room for innovation and alternative policies.

The future will show what the actual impact of the project has been. At the very least, it has contributed to an ongoing change in the region. At most it will later be evaluated as a key document that heavily influenced the whole development of the region and the transition arena members as key change-agents in the region. For the research on transition management, the project is of fundamental importance, since it serves to illustrate all the complexities surrounding transition management in practice and has been the basis of many transition management ideas and concepts that have already become adapted in a variety of other transition management processes. For my personal and scientific development is has been of major importance since it formed the context in which my own theory could emerge and my own transition could take place.

Intermezzo II

Transition arena Sustainable Living and Housing Flanders

Between 2004 and 2006, a transition arena and network were developed in the area of sustainable living and housing in Flanders, Belgium. This was the first transition management process outside the Netherlands and had two main objectives: to apply the transition management approach to sustainable living and housing, and to be able to evaluate the possibilities for transition management in Belgium. The Flemish government had realized that, in order to deal with long-term persistent societal problems, new approaches needed to be developed. In their first environmental policy plan (Flemish-Government 2003), they created the possibility for an experiment with transition management. This project ('Project 1') was to be managed by the department for the environment and infrastructure (www.lin.vlaanderen.be), administration for environment, nature, land and water policies Aminal (www.mina.be). Living and Housing was selected over the energy as domain of application. Martin van de Lindt (TNO, www.tno.nl) and Derk Loorbach (Drift, www.drift.eur.nl) were leading the project in which the Flemish Centre for Sustainable Development (www.cdo.be) and Pantopicon (www.pantopicon.be), an agency specialized in envisioning processes, were the other partners. In this two-year project, the transition arena methodology as presented in Chapter 6 was implemented to develop a vision, transition agenda and experiments for Sustainable Living and Building in Flanders.

Based on the experiences in Parkstad Limburg and the lessons learned in other projects, more attention was directed beforehand towards structuring the process, providing structured input for discussion and developing a transition network based on the transition arena. The whole project was structured in terms of number of meetings, intermediary products delivered and final outcomes. The process plan included much detail regarding the goals of different meetings, specific outcomes and a general timeline. This was partly on demand of the Flemish government, who were concerned for the project to produce results and who also wanted to understand how and why certain steps were made during the project. In the transition team the researchers therefore cooperated closely with government officials (from 4 different departments and institutions), and an advisory group of government officials from a large number of relevant government institutions was instituted. This provided the context within which the process itself, methodologies, the roles of the different individuals involved and the general focus of the project were discussed.

The project itself was structured in three phases: a preparatory phase, an envisioning phase and an agenda-setting phase. In the preparatory phase, the first steps involved internal discussions within the transition team about transition management, our conceptualization of sustainable development and the substance and goal of the Integrated System Analysis. The ISA was performed by the CDO with input from TNO and Drift (Deraedt et al. 2005) and involved an overview of different aspects of Living and Housing, such as housing stock, infrastructure, economic aspects, accessibility, health-issues, ecological aspects (energy, water, air), facilities, education of professionals and cultural aspects. In a synthesis it became clear that there were a number of persistent problems linked to this system: a rigid and individualistic living culture, a shortage of affordable, high-quality housing, limited flexibility in the building sector, limited space for housing, deteriorating local social networks, high environmental

impact, fragmented government policies and a general lack of trust and cooperation between the different actors.

Based on the ISA and a rudimentary actor-selection, an initial transition arena of 20 persons first met early 2005 to discuss the ISA and its conclusions. Actors in the transition arena were individuals from NGOs, government institutions, business, science and intermediaries. The transition arena validated the ISA by agreeing with the analysis in general, only suggesting some minor changes. This provided the basis for further debate: the actors shared a perspective on what the system Living and Housing constituted and agreed upon the necessity to deal with the perceived problems. Based on this general consensus, an envisioning meeting was organized where the transition arena defined criteria for a sustainable Living and Housing. These were defined as: closed material cycles, an integrated policy approach, shared responsibility & transparent decision-making, high quality of buildings and adjacent environment, accessible housing & social justice, balance between private and collective use.

In a third meeting of the transition arena four themes were selected which were perceived by the transition arena to be key issues that offered the largest possibilities for innovation as well as the largest barriers for sustainable development: material cycles, building-sector, local livelihoods and spatial planning. In the five structured meetings that followed, the transition agenda was developed. Four working groups were established: Closed material cycles, (Co-)learning and innovating in the construction sector, Living for Life and Living Cities. The guiding principles were translated into transition images for these four themes and different transition paths were formulated accordingly. The ultimate transition agenda included 18 concrete projects, a number of which were already supported. The work done in the working groups was more or less unstructured, but it was certainly directed by the transition team through discussion documents (Loorbach and Van de Lindt 2006), inspiration documents (Van de Lindt 2006), synthesizing notes, presentations and so on. Involved actors were stakeholders at the tactical level representing various organizations (roughly 85 persons), who often participated in their own time. This enlarged the commitment to the process and its outcomes and ensured the convergence of individual and collective interests at a systems level in the transition agenda. In the autumn of 2006, this transition agenda was presented to the Flemish government. All relevant documents can be found at www.mina.be/duwobo.

The project and its outcomes (a transition network with a shared transition agenda) show that it is possible and worthwhile to implement the transition arena model integrally. In a context different from the regional approach in Parkstad Limburg, this transition arena focused on a national system without clear boundaries. Initially, the participants had some difficulty to conceptualize the Living and Building system, but later on in the process when the four transition themes were selected it became easier to handle. This was perhaps because these themes could be clearly distinguished as sub-systems for which system innovations could be envisaged. Maybe related to the relatively difficult system (as opposed to societal systems like energy, agriculture and mobility), a shared sense of urgency to act was largely absent and the involvement of individuals was mostly based on the possibilities to further the interest of innovators and organizations involved in the field. Nevertheless, the transition agenda that was developed provides an innovative and integrated framework for concrete action

and is widely considered as an important development for the sector. Regular policy has also acknowledged the importance of the transition arena and agenda and will continue to fund both. Involved actors will take initiatives to develop projects further and agendas and a strategy will be developed to evolve the network and implement the transition agenda.

What did we learn about the transition management approach?

Without going into details of the project and without drawing conclusions regarding the success of the project (it is too soon to judge that), we can already draw some conclusions regarding the possibilities for transition management internationally. Besides, the project offers us the opportunity to reflect upon the effectiveness of the transition arena model. The first results of a project evaluation that includes interviews with key actors involved in the project, questionnaires amongst all participants and a small number of evaluation meetings are as follows:

- The project was perceived to be a success in terms of output by all those involved.
- The participants found the process innovative.
- The participants found the process difficult and sometimes even stressful and chaotic.
- The participants did feel that transition management is not compatible with Flemish political culture (70%), but they also felt that transition management could very well be applied in other domains (90%).

In this project, the 'transition (management) team' included government officials, substance experts and transition experts. However, it became gradually clear that a number of transition team members were not frontrunners or innovators, but instead adhered to a regular policy approach. This meant in practice that it was difficult to adapt the process to changing demands or dynamics within the network, that it was difficult to divert from the initial process plan, that it was almost impossible to reflect upon the overall process and process goals and that the majority of the time spent was directed to dealing with details of meetings and products. The organization and facilitation of the transition arena process therewith became a very time and energy consuming task and did not produce significant spin-off in terms of institutional innovation, communication of the transition arena process or institutionalization of the transition arena itself. Although the transition arena has built up enough common interest, ambition and knowledge to continue, much more could have been achieved if more entrepreneurial individuals from the government had been involved in the transition team.

It became clear from the interviews and questionnaires that it was not in general a very smooth process. Especially within the transition team, intense discussions between transition researchers and the representatives from the Flemish government led to feelings of uncertainty and chaos. It proved to be difficult to convince the government officials and others involved in facilitation of the transition arena that such an uncertain and sometimes chaotic process would lead to successful outcomes, only based on previous experiences of the transition researchers involved. In other words, while the transition researchers claimed that a transition management process always involves friction, uncertainty and

even disappointment besides excitement, creativity and innovation, other actors involved felt uneasy with this and continuously looked for ways to achieve more structure and control.

When for example there were tensions within the transition arena, or when a session did not deliver very concrete results, the government officials became nervous and tried to structure the process or increase their grip on it. The transition researchers then tried to prevent this in order to maintain the creative space for the transition arena. Although this was never an easy process, it proved to be crucial for the ultimate success of the project, because those involved gradually internalized the transition management approach and developed a strong commitment to the process. When ultimately the results did indeed please everyone, it became much easier to be committed to the process. A general insight must be that transition management processes are by definition uneasy: one needs to let go of certainties while not yet knowing the alternatives. This means that meetings can never be fully structured, that outcomes can never be fully planned, that participants cannot be commanded and that it is impossible to predict the impact of the results. Learning to deal with this type of process is perhaps at the heart of transition management.

What did we learn regarding the transition arena model?

The project proved more in general that the transition arena model is effective and can be adapted to any context in order to develop long-term innovation policies. This requires a continuous iteration between the individuals involved in the transition team, much communication between the transition team and the transition arena and in general much attention to a 'translation' of (the experiences with) transition management in the Netherlands to, in this case, the Flemish context. Although any transition management process will be complex and require creativity, this project proved to require even more attention and time and illustrated the necessity for an experienced transition team and a learning-by-doing attitude. The project illustrated the universal applicability of the basic principles of transition management and the transition arena. It also underlined once more the importance of certain elements of the transition arena model: the composition and functioning of the transition team, the selection of stakeholders, the timing and flexibility of the process and the management of the interface between the transition arena and regular policy.

A similar observation can be made regarding the transition arena and the transition working groups. The selection of participants was done by the Flemish experts in the field of Living and Housing with some selection guidelines. During the process, it became clear that there were an insufficient number of strategic visionaries and too many representatives from the field. The transition arena was very large to begin with (20 persons), and during the selection only limited attention was paid to individual competences, skills and abilities. This made it very difficult to be creative and original in the envisioning phase. Because of an imperfectly functioning transition team and transition arena, the strategic phase was not successful in producing a fundamentally new perspective on the issue and an associated alternative and inspiring vision. This was also partly due to the lack of resistance to outside pressures from the transition team, which in practice led to a too early shift from the strategic to the tactical phase. Related to the uneasy feeling some had with too abstract meetings and uncertain

outcomes, the transition team did not withstand the outside pressure to deliver results, concrete input to other policy processes and the expectation that also the participants would demand more concrete action and discussion.

During the tactical phase of developing transition images and pathways, the participants became much more involved and committed to their specific themes. This was partly because of their natural affinity with the themes and their desire to realize individual or organizational goals. Although this phase produced a large number of transition paths, project ideas and concrete coalitions, the strategic objectives and overall ambitions were scarcely taken up explicitly. This was partly due to the absence of part of the strategic transition arena members who left the process for a number of reasons, and partly because of a too quick shift from the strategic to the tactical phase because of time-limitations and pressure to produce concrete results for policy. The main lesson drawn here is that selection of participants and partners in transition management processes is crucial for the success of (at least) the strategic and tactical phases and needs to be researched further.

Chapter 9

Energy transition and transition management in the Netherlands

9.1 Introduction

Energy supply is emerging as a central theme in the context of sustainable development. A number of unsustainability symptoms related to the current energy systems have contributed to this: air polluting emissions and climate change, dependency on external suppliers, instability in oil-producing regions, exhaustibility of resources, uncertainties about reserves and high resource prices. It is increasingly becoming clear that a structural change or transition is inevitable in order to overcome these unsustainability symptoms. While 10-20 years ago the primary concern regarding the energy supply was the amount of resources still available, nowadays dependence on unstable regions and climate change provide the dominant arguments for reflecting on and development of alternative energy systems. Although the time horizon on which systemic crises in our current energy supply (such as large black-outs, unstable supply, unaffordable energy, international energy-conflicts etc.) will occur is contested, there is already a large agreement among societal actors (from sustainable energy companies to NGOs and governments and even to some extent regime actors such as Shell) that new a new energy-infrastructure needs to be built up. Such new infrastructure could be based on sustainable or other new energy sources, based on new patterns of consumption and production (energy efficiency), on reducing environmental impacts or on new technologies to prolong the use of fossil resources. In this context of uncertainty and structural change, transition management seems to be a plausible approach.

In 2001, the Dutch Ministry of Economic Affairs (EA) started developing transition management to accelerate and direct a transition of the Dutch energy supply system. This process has been labelled the 'energy transition' (ET) and is an example of transition management at national level. Without a strict methodological or theoretical basis as presented in this thesis but based on the early transition management principles as formulated in the report by Rotmans et al. (Rotmans et al. 2000), the ministry itself further developed a transition management process and method in cooperation with all sorts of actors. So far this has been a process of learning-by-doing and doing-by-learning in which (transition) researchers have played an active role. As a case-study, the energy transition process can be analyzed at four levels. It illustrates:

- how transition management can lead to new, innovative policies at a national level for a specific domain
- what the possibilities and difficulties of implementation of transition management at the national level are
- what the added value is of reflection on such a process from the perspective of transition management
- how the implementation process itself can *transitionize* a regular policy context.

This chapter is divided into three parts. In 9.2, we describe and analyze the energy transition process itself as it was organized by the Ministry of Economic Affairs. In part 9.3 we reflect upon the energy transition process as organized by the ministry from the perspective of transition management and we formulate some recommendations. This reflection will also include a broader perspective

on what the energy transition entails and in what way transition management should be conceptualized in that context. Finally in 9.4 we draw some conclusions regarding the benefits and difficulties of implementing transition management within a regular policy context.

9.2 The approach of the Ministry of Economic Affairs

When the various Ministries started implementing transition management, the concept itself was only roughly sketched. Especially the stakeholder process aspects were weakly developed. In the period between 2001 and 2005, one could say the concept of transition management was simultaneously theoretically deepened and operationalized in an iterative manner through involvement of transition-researchers in the implementation. Several activities were undertaken as part of transition management by the Ministry of Economic Affairs. The ministry started by making an inventory of all relevant actors and activities related to sustainable energy nationally and internationally. Based on this inventory, supported by scientific data, the working group 'lange-termijn visie energievoorziening' (long-term vision for the energy supply-system), produced the scenario report 'Energy and Society in 2050' (EA 2000). This report combined the analyses of different trends related to economic growth, energy consumption and industrial development with projections about yield and supply of (alternative) energy-resources ranging from fossil resources to biomass. In its analysis, the report distinguished four possible future worlds along the axes long term (gain) versus short term (gain) and regional versus international. In each of these 'worlds' (scenarios) ('Global solidarity', 'Global markets', 'Regional networks' and 'Regional isolation') the need for and sources of energy were identified. Based on this analysis, the so-called robust elements of the future energy system were believed to be those that fit in all four scenarios, namely biomass, natural gas, energy efficiency and wind-energy.

Based on the different scenarios a number of 'quality criteria' were defined for a desirable future energy supply system. These would later on become the central elements of the overall vision:

1 **security of supply**: reliable provision of energy services
2 **economic efficiency**: low prices thanks to economic efficiency and market dynamism
3 **sustainability**: minimal negative environmental and social impacts (EA 2000 23).

The term 'sustainability' was used in this context to refer only to the environmental aspects, but would later become more frequently used to refer to the combined set of quality criteria for the energy system. In the report, low-carbon and minimum waste were singled out as the most important environmental aspect, which meant that the energy transition at that point was about cheap, reliable and emission free energy supply. In addition to the functional goals identified (having to do with the way in which services are provided) in the scenario study, a working group of the ministry defined non functional-goals. Officially, non-functional goals are the creation of energy business and contribution to policy renewal, no negative impacts elsewhere (for example the use of biomass should

not create environmental or social problems in developing countries), and self-sufficiency (but this applied more to the EU than to the Netherlands (EA 2001)). It should be noted that these goals were deliberately not quantified beforehand. Apart from the many uncertainties that made it difficult to set goals, it was believed that the formulation of qualitative ambitions instead of quantitative targets kept the process of change open.

The Energy and Society in 2050 report was evaluated by the Central Planning Agency (CPB) and an independent German Institute (Fraunhofer Institute) and was presented on the website of the ministry. The initial document that formulated the ambition of the ministry to initiate and facilitate the energy transition (EA 2001) was presented and discussed in internal meetings, working groups, stakeholder meetings, a website-forum and a final conference organized by the ministry. The process was also aimed at analyzing and creating the support for the transition approach and the four themes. The discussions showed that the choice for the main routes was recognized by the stakeholders and supported by the market. There also seemed to be enthusiasm for the transition approach and very large interest amongst business and science especially to participate. Although there were some discussions about the involvement of solar and wind-energy as themes, the consensus was that these options were not innovative enough or were already established in some form and should not be part of at least the first phases of the process.

The general ambitions were translated in four thematic areas (later on called "main routes" of the energy transition), that were identified based on the scenario study and consultations with a very selective group of stakeholders. The robust elements that became formulated as themes in 2001 were:

1 New (efficient and green) gas
2 Modernization of energy chains (efficient energy and material use throughout production-use chains)
3 Biomass International (for products, materials and energy)
4 Sustainable Rijnmond (an industrialized and urbanized region in the Netherlands).

For these four themes separate projects were set up to start up interaction with the stakeholders interested in the theme to build up a network of innovators and to identify possible promising transition paths and experiments.

In 2002, EA started the Project Implementation Transition management (PIT), led by senior EA official Hugo Brouwer. The PIT project further consulted stakeholders, but also theoretically reflected upon the type of governance needed, the role of the ministry and the broad outlines of the process under the heading "policy renewal". The project team consulted with business and other stakeholders, seeking answers to four central questions:

- Do they agree with the ambition of the ministry and approach of transition management?
- What would they like to get in return for their involvement?
- Does the energy transition require changes in policy; what changes in policy and instruments are needed?
- How may profit-opportunities be enhanced and risks be reduced through financial support and other types of measures?

From these consultations emerged that the ministry should be trustworthy; manage its own affairs well; be consistent and create greater consistency between different policy domains; be able to bring together parties (match-making); not be too much technology-oriented but find a balance between technology and organization; be a partner of forerunners; offer financial support, and finally be committed to sustainability and the new approach of transition management (Beleidsvernieuwing 2003).In addition to this, the PIT report identified a number of conditions for success (EA 2003 8):

- responsibility of EA for the process
- cooperation between government and stakeholders as a starting point
- concrete and result-driven approach
- controllable process
- internalization of the transition approach (within EA and stakeholders)
- interdepartmental cooperation

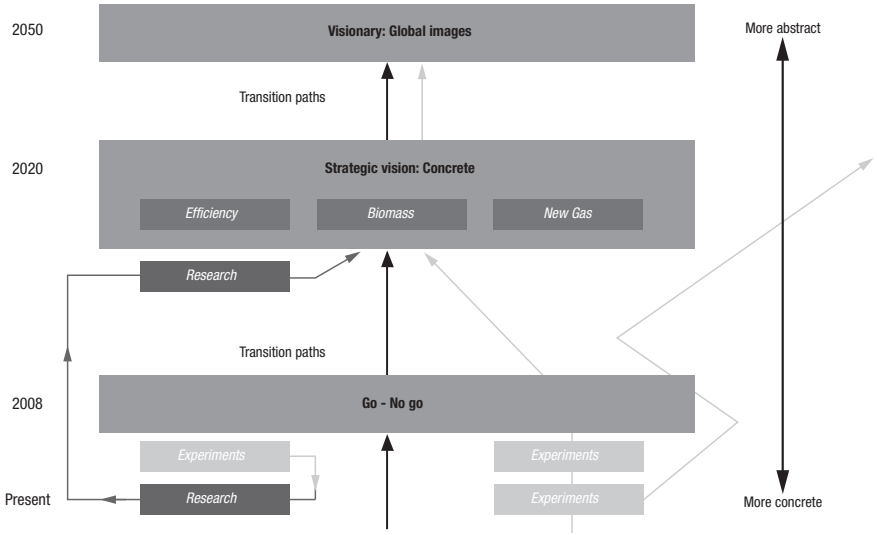


Figure 9.1 Energy transition process

Terms like 'transition images', 'transition paths', 'transition experiments' from the ICIS-MERIT report became part of the EA vocabulary. The PIT team for example formulated goals to be realized within 2 years (EA 2003):

- a long-term vision developed and supported by societal stakeholders as a basis for transition paths
- commitment to the energy transition by the societal stakeholders
- for EA to remove the barriers for transition experiment and meet the stakeholder demands as much as possible
- a proposal for the organization of knowledge related to the transition
- completed analysis of international developments
- communication activities in support of the transition
- a proposal for the next phase

In conclusion, the process was continued and the focus needed to shift towards concrete transition paths and transition images. The process was visualized as shown in Figure 9.1 (based on: EA 2003 10).

Because of the successful preparatory phase, the ministry decided to continue the approach and to continue funding the different sub-projects. For the four transition themes platforms (transition arenas) were set up to enable and facilitate discussions within the framework of the overall ambition and the context set by the scenario-study. Stakeholders involved in the platforms were predominantly organizations from business and science that were explicitly active in the areas of interest. They were not so much selected for (individual) competences, equal representation or their specific roles within networks, but rather for their possible contribution to development of new technologies or markets. The selection was done by the chairs of the platforms (who were selected by EA because of their networks and experience in the platform's theme), often from their own networks. The platforms were given the explicit task to develop shared visions, transition paths and transition experiments that were as concrete as possible. Most platforms then started to develop thematic visions, some quantitative (Biomass: 'green resources will have replaced 30% of the resources used for our energy supply in 2030' (Van Herwijnen 2003)) and some qualitative (Sustainable Rijnmond: 'To *C* or not to *C*, that's the question' (Bosma et al. 2003)). Within the context of these thematic visions, paths were worked out by the transition teams 'new gas', 'biomass international', 'sustainable Rijnmond' and 'modernizing energy chains'. In addition 80 ideas (70 proposals) for transition experiments were collected in the areas of new gas, biomass, energy-efficiency and industrial ecology. The overall aim of the transition experiments and paths was to achieve an energy system characterized in the overall vision through learning about different options, bottlenecks and uncertainties.

The general approach was to formulate general qualitative ambitions which served as a framework for similar discussions on the level of the different options (main routes). For each of these options "ambitions" were formulated by the transition teams based on stakeholder consultation. The general conditions under which the discussions should take place were set by the exploratory phase of the scenario-study and the participatory process underlying it. The real debates, however, about how specific options could or should be used and what their potential would be, were held on the sub-level of the main routes. This meant a bottom-up definition of options and sometimes an explicit choice for leaving different, competing, options open. The discussions about biomass for example, provided a new forum for interaction of a wide variety of stakeholders active in this field and for debates about different perspectives on the issue. It soon became clear that, although there was a shared interest in developing the biomass-network and concrete ideas for application, there was much difference in the expectations of the yield of different sources of biomass and the best way to process these forms of biomass. These discussions were already quite functional in providing insight into the complexity of the issue and the variety of options. Not all actors agreed with the specifics, a more general level of understanding was created to enable convergence with regard to formulating ambitions and transition-paths. For 2030 the formulated ambition was to replace 30% of the resources in the primary energy supply by green resources (biomass). According to the platform, this ambition could be achieved by using green resources

in four areas, the so-called transition-paths. In 2030, 60% of total fuels, 25% of resources in the chemical sector, 25% of resources for electricity and 17% of resources for heating would be 'green'.

These goals were collectively defined by industry, NGOs, the ministry and scientists, who also formulated possible routes to these outcomes. There was much debate upon the value of the numbers, the actual credibility or plausibility of the ambitions and the different areas in which the ambitions should be realized. However, by debating upon these ambitions between stakeholders with different perspectives, it seems that the ambition became increasingly concrete and achievable. While in 2002 an overall ambition of 30% was believed to be far too ambitious, in 2006 it was already seen as perhaps too modest under the influence of biofuels breaking through, new technological developments in the chemical sector and the involvement of more innovative and ambitious stakeholders. The strategic goals for 2030 were called 'ambitions', something to aspire to. It should be noted that the ambitions are not "hard goals" for policy; they will not be used for hard-nosed political evaluation. They are soft goals reflecting uncertainty about the options and the economic and political-administrative context and will be adapted with time. A quintessential element of transition management is that no collective choice is made as to energy technologies and sources. The four transition paths for biomass (biofuels, biochemicals, bioelectricity, bioheat) comprise some 30 specific technological and societal options that will be explored in the so-called transition coalitions; coalitions between technology-developers, companies, researchers, NGOs and government.

Bioplastics

One example of a coalition which was developed by the industry itself in the context of this process is the network on bioplastics (BCPN). Different actors developing different kinds of bioplastics (plastics based on biomass), ranging from flower-pots to plastic bags and pens, organized themselves into a branch organization to develop a community, facilitate debate and provide a communication channel for the community toward government and society. Within three years, they developed a logo, a website, a strategic agenda and some successful examples. During this time, discussions of the organization with the government led to progress which could not have been achieved by individual companies, such as the possibilities created by almost all municipalities to include bioplastics in the compost. This had not been possible for a long time because of the lack of coherence in the sector, the fact that bioplastics could not be recognized, retail would not sell it, regulations prohibited it and consumers would be confused by it. Through the creation of a learning community including all the stakeholders, and slowly working towards a shared agenda, conditions were slowly changed to enable the breakthrough of bioplastics on a larger scale.

Heating Company

A recent example of a transition coalition executing a transition experiment co-funded by the ministry is the 'Warmtebedrijf Rotterdam' (Heating Company Rotterdam, HCR). This coalition of industries, local and regional government,

housing corporations and energy companies, has developed an experiment in which residual heat from industrial water is re-used to heat houses. The project first started to provide heating for 4500 houses, but plans to increase the numbers in the future. Energy companies will build the first heating network, which in the future could be expanded to provide energy to up to half a million consumers in 2020 (ambition). The first phase provides emission reduction (6% of Dutch Kyoto targets). Out of the total cost of 124 Million Euros, 27 million is uneconomic and will be covered by the ministry (20M) and the city of Rotterdam (7M). An interesting detail is that just after the liberalization of the Dutch energy market, the local council of Rotterdam and the ministry thus created a new (public) utility company.

Box 9.1 New Coalitions

Next to organizing and facilitating the stakeholder process, the ministry has tried to undertake activities supporting the development of the transition-network. For example, there has been an evaluation of existing policy programmes from the point of view of their contribution to the energy transition. One such programme is the GAVE programme, a chain demonstration programme for climate-neutral fuels, that was not explicitly based on transition management but bore some of its characteristics. Goal of the evaluation was to learn from the experiences based on a transition analysis and to develop through the evaluation process more insights about the operational aspects of transition management (ICIS 2003). Another policy integration exercise was the evaluation of the government energy-related research and technology development (Energy Research Strategy, EOS), where 63 projects have been analyzed on the basis of two criteria: knowledge position of the Netherlands and contribution to sustainable energy system. This led to the identification of spearhead-projects that scored high on both accounts. Projects with a positive contribution to a sustainable energy system and weak knowledge position of Dutch firms were labelled "knowledge import" themes, whereas projects with opposite scores were labelled "export themes". The EOS evaluation appears not to be a direct result of the government's commitment to transition management, showing that the government was already using a strategic portfolio approach for energy R&D.

Simultaneously, the ministry seriously tried to alter existing financial instruments so that they fitted the energy transition. In addition new instruments were developed, such as the "Regeling Ondersteuning Transitie Coalities" (Support Transition Coalitions, OTC) for transition experiment coalitions and the "Unieke Kansen Regeling" (Unique Chance Arrangement, UKR) of 35 million euros for transition experiments. In order to qualify for support the experiments should

- be part of an official transition path
- involve stakeholders in an important way
- have explicit learning goals for each of the actors of the consortium.

For transition experiment coalitions a total budget of 1.5 million euros was made available for feasibility studies with a maximum support of 50,000 euros per coalition. Both instruments came on top of the 173 million euros for energy innovation. It is hard to tell how much money overall is involved in transition

management projects. The ministry's budget for transition-policies is estimated to have risen from around 200,000 euros in 2000 to roughly 80 million euros for 2005. Part of this budget is 'relabelled' money, which otherwise would also have been invested, but in more traditional energy research and experiments. Part of the money, however, is in new funds such as the UKR and the OTC-funds. Besides these investments, the ministry is also committing a growing number of officials to the process, creating an evolving learning-community within the ministry. Two other remarkable funds are the Bsik-funds, a national research fund of over EUR 800 million, out of which close to 200 million is spent on innovative energy-research, and the EOS which is now directly linked to the energy-transition management.

In its role of facilitator, the ministry has also taken efforts to remove institutional barriers. A good example of this is the Trendsetters' Desk (TD), a government service point which is meant to service initiators of experiments and transition-related activities. This includes both financial support and support in the areas of policy and legislation. For example, it helps businesses whose Energy Transition projects are hampered by permits, legislation or regulations. The Trendsetters' Desk looks for solutions for these bottlenecks. The service point received some 50/60 questions in 2005, but in 2006 the number had risen to over 10 a month. Most questions come from SMEs and relate to financial and institutional barriers. An interesting observation is that most of the problems could be solved, the only category in which only a very small percentage of the problems could be dealt with being 'government coherence'.

According to the ministry itself, the transition approach gives new impulses to the innovation system in three ways (EA 2004):

- the process of visioning in the sub trajectories with active involvement of business, governments and societal organizations and knowledge institutes, resulting in a shared sense of direction
- novel coalitions have been founded of parties who were previously each other's enemies (an example being the biomass coalition of business and the environmental movement and the involvement of Greenpeace in offshore wind energy).
- Niche markets are being sought for a number of transition paths.

In 2004-2005, the energy transition process gained speed. This was partly because of external developments such as destabilization of the Middle-East, rising oil prices and acceptance of climate change. For a large part, however, the process was accelerated because of internal reasons such as the growing interest in the process, documents developed and concrete successes (energy-producing greenhouse, heating company). The growing attention for the issue along with the progress made by the platforms led to a further growth of the energy transition network. In 2005, a platform for sustainable mobility was added to the energy transition (previously a separate transition process) and in 2006 two new platforms on sustainable electricity and on energy and built environment were established.

Energy producing Greenhouse

In the Netherlands, greenhouses make a large contribution to agricultural production, but they are at the same time very energy consuming (app. 20% of the national natural gas used!). The idea behind this experiment is to develop an innovative greenhouse that stores heat and energy in summer and uses this during winter. It does so by using heat pumps, isolation, new producing methods and other innovations. This way, the greenhouse can be energy neutral or even energy producing. The basic idea had been posed by its creator Van Andel since early nineties, but only gained support since the NMP4 and the energy transition process provided a context in which the Innovation Network for Green Areas and Agriculture (*Innovatienetwerk Groene Ruimte en Agrocluster*) could start to develop support for the project. The first steps involved the development of a vision of a climate neutral greenhouse sector and of a network of potentially interested actors. In this context they worked out details on technological, institutional and financial conditions. Initially, there was a lot of disbelief but this was gradually overcome by providing detailed calculations, demonstrations of new technologies and linking new innovations and innovators from different areas. In this process, the innovation Network acted as broker and facilitator.

In 2006, the pilot Energy Producing Greenhouse was opened by the Minister and gained a lot of attention from the sector. The ambition formulated was that greenhouses in the (long-term) future should supply themselves, and perhaps their surrounding area, with energy. Under the influence of high resource prices and the (economic) benefits of energy efficiency, the experiment raised the awareness in the sector and led to a large number of spin-off activities and interest for follow-up experiments. Not only has it proved to be a technologically feasible experiment, it is also economically and environmentally beneficial. It will take some time before this type of greenhouse will become standard and every existing greenhouse will be transformed. It is a typical transition-experiment with radical innovation potential. It generated a number of different and coupled innovations, and various lessons were learned during the experiment (institutional, regulatory, behavioural, technological, etc.). The governance of this experiment is a typical example of transition management at the operational level: the role of the innovation network was primarily that of facilitator and stimulator of envisioning, agenda-building and controlled experiment. The success of the project, however, was also largely determined by autonomously operating innovative individuals, by surprising developments and sudden support, by changing (economic) trends and actors and coalitions on various levels.

Biomass terminal

This experiment intends to find out the possibilities for a biomass terminal in the Rijnmond area (Rotterdam harbour). Since biomass is expected to contribute more and more to our energy supply and the ambitions and targets formulated for biomass use are high, the import (and export) of biomass will also have to increase. The Netherlands have a history in logistics and transport and are strong in these areas. The main-port of Rotterdam already houses

terminals for energy resources along with large energy producers and petrochemical industry, which together provide an environment in which a biomass terminal would logically fit. There are, however, a large number of regulatory, judicial, financial and institutional barriers. Because the import of biomass is still relatively expensive and the demand still relatively low, there is no private company that will build such a terminal by itself.

The experiment aims to develop a coalition of stakeholders (potential users, investors, logistical organizations, local and national government) that could establish a biomass terminal. At the same time, the regulatory and financial feasibility of the terminal will be researched. Then, a concrete plan will be developed within the coalition that includes location, import routes, technologies and market research. The ambition is to realize a biomass terminal within a few years. The experiment can be said to facilitate other biomass-related activities and ambitions because it tries to contribute to the development of the biomass-infrastructure. By linking it to ongoing activities (e.g. logistics, chemical sector, transport) and anticipating on future developments (e.g. rising resource prices, increasing biomass use) this experiment offers high potential for learning, spin-off innovations and emergence of new structures.

Box 9.2 Transition experiments

Two final important developments are the establishment of the so-called taskforce energy Transition and the Interdepartmental Projectdirectorate Energytransition (IPE) in 2005. The Taskforce, led by Rein Willems (CEO of Shell Netherlands), is a strategic group of around 15 high-level representatives from science, business, NGOs and government and was given the assignment to reflect upon the overall process of energy transition, to define a shared direction and in general to stimulate the impact of the energy transition, in the first place by identifying economic chances. The Taskforce collected the transition paths and experiments of the different platforms and combined these with a scenario-study on future developments in energy-production and consumption into the overall 'Transition Action Plan' (TAP) *More with Energy* (Taskforce-EnergyTransition 2006). In the TAP, the Taskforce presumes that fossil resources will remain the main source of energy in 2050 and our energy consumption will keep growing, but that with increased energy efficiency, gradual growth of sustainable energy sources and implementation of new clean fossil technologies, the emissions can be reduced by 50%. The main messages raised by the TAP are the need for consistent energy policies that transcend political trends and for a substantial increase in government investments in sustainable energy.

For the coming years, the TAP will set the tone for the exploration of the transition paths and implementation of the transition experiments. Changes in the political landscape will perhaps also determine how the energy process will evolve, but it is believed that the societal support for and commitment to the energy transition will ensure continuation. For EA, the following things are on the policy agenda: revision of generic policy (for instance greening of the tax system) based on experiences with the energy transition; widening of the group

of stakeholders involved (including citizens) in the energy transition; discussion of energy transition policy with other countries (in the EU and IEA); review of the energy research strategy (EOS) and other financial instruments; monitoring and evaluation of the energy transition process; active communication and involvement of the public; further investigation of the link between current policy and transition approach (EA 2004).

The Interdepartmental Projectdirectorate Energy transition was established because of the perceived need for policy integration but also explicitly because of the desire to learn from the experiences in the context of the energy transition and in other domains. Energy is seen as an integrative theme and the energy transition should function through the IPE as a driving wheel for other transitions. In the IPE innovative government, officials concerned with transitions in their domains (energy, agriculture, mobility, housing and themes such as knowledge, innovation) come together to reflect upon the process and the outcomes with two goals: to facilitate and govern the energy transition process in a better way and to innovate policy and government institutions in line with the requirements of transitions. The establishment of the IPE itself can be considered a policy-innovation and is also a clear example of policy learning within the Ministries, since it arose from experiences within the process that indicated a lack of coherence, innovation and learning at the strategic policy level. The IPE could be considered as the successor of the project team Policy Renewal, which was the EA internal working group (niche) where energy transition management was developed in the first place. The IPE will function as a semi-autonomous think-tank for the energy transition.

In conclusion, it seems that the activities of EA have been quite successful. Within a period of five years, an experimental process has led to the involvement and commitment of hundreds of professionals, to a shared agenda and concrete projects. The process contributed to creating more sense of urgency for the issue and political attention for the subject. In that sense, it seems that in terms of creating more opportunity for business and more support for innovation, the EA transition process was accelerated. In terms of defining the direction of the transition, it seems that the TAP along with the platform visions and transition paths has contributed to convergence of the expectations and ambitions of the actors involved. We have to remember that when EA started the energy transition, it was regarded as a policy experiment and only very rough ideas existed upon how to 'manage' transitions. Realizing this, it is important to understand why the process has been successful so far and perhaps even more important what lessons we can learn from it that could benefit transition management in other sectors and in the future. The central question guiding this evaluation is whether the 'energy transition' as facilitated by EA had the desired impact on the societal transition process and whether from the perspective of transition management even greater progress could have been made. In the next section, we will evaluate the energy transition based on the transition management approach as formulated in Chapters 3, 4, 5 and 6. The evaluation in the first place intends to identify lessons we can learn for transition management in general, but will also generate some recommendations regarding the further organization of the energy transition. Finally, we will reflect upon the general lessons we can learn from the energy transition regarding the possibilities and difficulties of implementing transition management in a regular policy context.

9.3 Evaluation: transition management?

The transition approach of the ministry is conceptually based on transition management as defined in (Rotmans et al. 2000) and in this thesis. The transition instruments and process components in particular that were used by the ministry are recognizably drawn from the scientific work on transition management: transition images, transition paths, transition experiments, transition platforms and transition coalitions are now all terms integrated in the jargon of the ministry. The actual process management approach, the operationalisation of the transition instruments and the concrete products developed seem to be significantly different from how these are defined in this thesis. Of course this is the result of the dynamic interaction between transition research and transition practice during the period 2000-2006. Obviously, the unfolding energy transition management has been heavily influenced by the individuals working for the ministry, directly and indirectly (e.g. platform chairs). The ministry chose, in line with the transition management starting points, a participatory approach and consulted a large number of advisors/consultants, scientists and other actors. The process as it evolved is therefore in a sense emergent; it was facilitated, partly structured and managed, but also organized by small sub-networks and coalitions, influenced by societal developments and sometimes suddenly enforced. In this section we reflect upon the energy transition through the multi-level, multi-phase transition management framework and the complexity based transition management starting points. The evaluation in this section is intended to clarify the added value of the transition management approach and framework as presented in this thesis and reflect upon possible future changes or additions to the energy transition. Although it is generally believed that the past few years have shown a new development in policy-making, it is so far still questionable whether this really signifies a break in the development of policy making and whether this development will last. It is therefore necessary to make an inventory of what has been learned in the past period and translate these lessons into new actions.

In hindsight, it seems that in the first phase the ministry underestimated the potential of the transition management and the importance of providing a solid basis for the transition management process. In terms of analysis and in terms of process, the first phases of transition management (expert preparation and the transition arena) were skipped and a type of process management was used that has all the characteristics of a stakeholder-network and consensus approach but not those of a selective, frontrunner oriented multi-level approach. The ministry, perhaps in its desire to achieve concrete results with the primary aim to stimulate business, opted for creation of networks within themes in which developments were already ongoing and large companies were active in innovation. In a sense, the ministry did not pay much attention to the strategic level for the first few years and did not include the demand-side. The focus was on creating business based on the belief in market-forces to facilitate the transition to a sustainable energy system. The approach has led to network-building within the sustainable energy field, and a large number of projects and experiments in the selected areas, but it seems that by lacking a strategic transition management and strong actors promoting alternative visions, the up-scaling potential of the experiments is limited, societal awareness is lagging behind and important chances for sustainable energy (behaviour) in various societal sectors have been missed.

The state of the system should determine the way it is managed and how and what instruments are used. The demarcation of the issue and an integrated analysis including a scenario study should provide the basis for reflection by a transition arena. From a transition perspective, such an analysis should at least go back 30-40 years and focus on the evolution of our current energy-system and its regime in order to understand the present day culture, structure and practices. The ministry did execute a forecasting scenario study and an assessment of unsustainability problems, but these studies were neither participatory nor did they include a thorough integrated systems analysis. Such an analysis should provide the basis for discussing the unsustainability of the present regime as basis for developing a sustainability vision. It also provides a perspective on the magnitude of the challenge of the energy-transition, its possible ramifications and scope. In other words, by limiting the 'energy transition' to an issue of creating sustainable energy business, the behavioural, institutional, structural and cultural changes needed are more or less ignored. Below, we sketch what such a transition analysis for energy could include without pretending to be comprehensive. It is meant to illustrate how a transition analysis not only can support the development of a shared understanding of the present, but also offers a perspective for reflecting upon the transition challenge ahead.

The Dutch energy system

The Dutch energy system could be defined as: 'the system of provision and consumption of energy including all relevant social, economic, ecologic, technological, cultural and institutional factors'. The Netherlands, like many other western industrialized countries, has an energy system based on fossil fuels (oil, gas, coal) with a large domestic supply of natural gas. In general, natural gas is used for heating (mainly in households) and energy provision, (imported) oil is mainly used in mobility and industry and coal is used both in energy provision and in industry. A minor percentage (ca. 2,4% of the total energy consumption, (CBS 2005)) is considered sustainable. The market is dominated by large energy companies that have recently been liberalized under pressure from government and international companies. The dominant policies are increasingly defined at the European level, although Dutch ministries still have a strong influence on both the market and limiting the emissions caused by energy production and consumption (through environmental and regulatory policies). Consumers are not constantly aware of the need to limit energy consumption, since prices are (still) relatively low and incentives for reduction are absent. This is illustrated by the ongoing increase in consumption of energy intensive products, the increase in energy use in households and the low levels of interest for the issue in the societal debate.

In order to understand the origin of the current energy regime structure and its resistance to change better, we need to analyze the historic evolutionary pattern of this system. During the 1920s, in terms of structure, culture and practices we can characterize the energy regime as decentralized, small-scale, extensive and based on coal and renewables. Energy consumption was relatively low compared to present day consumption. Cars were a luxury product, there were only local grids in the cities for heating (Verbong 2000), industry

was mainly using domestic coal and general energy use as a result of consumption was minimal due to the absence of electric appliances. The chemical sector was still nascent and international oil-infrastructures and institutions were lacking. This equilibrium was based on domestic sources (coal, turf and biomass), small-scale technologies and infrastructures and low levels of energy-use (Schot 2000). The equilibrium was broken by the after-war period of reconstruction, economic growth and consumption which directly led to an increasing demand for energy.

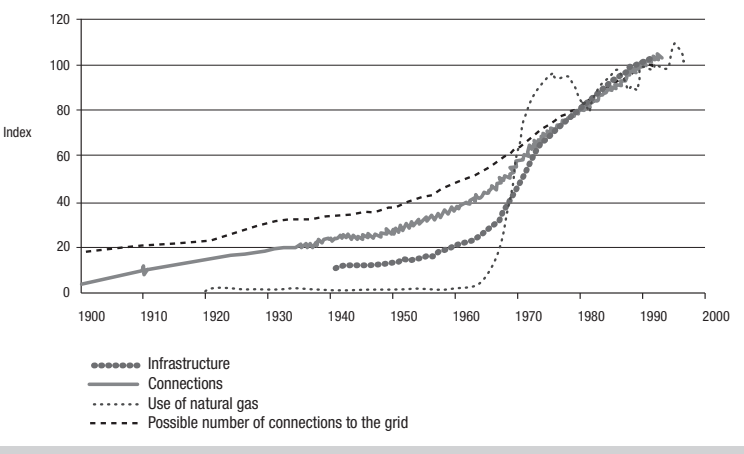


Figure 9.2 Infrastructure, connections and use of natural gas (indexed for the year 1990). (Taanman 2004)

During the 1940s and 1950s population growth, economic growth, new technologies and industrial changes led to a rapid growth in energy-demand. In sectors such as the chemical industry, agriculture and housing, increasing demands for energy required new infrastructures and resources. The development in infrastructures in its turn led to an increase in use (with some delay), see Figure 9.2 and 9.3). A growth in car-mobility and -ownership led to the development of oil-import, refineries and fuelling stations. By the end of the 1950s the energy transition was in take-off (see: (Schot 2000 12)), shifting to an increasing use of oil.

The following underlying system innovations can be observed:
- From coal to gas between 1950-1970 (Verbong 2000),
- From carbo-based to petro- and synthetic-based chemical industry in the Netherlands (Schot 2000) between roughly 1940 and 1980,
- From individual to mass use of automobiles between 1950s and 1990 (Schot et al. 2000).

These co-evolutionary processes have led to the dependence on oil (in industry and mobility) and gas (for electricity and heating).

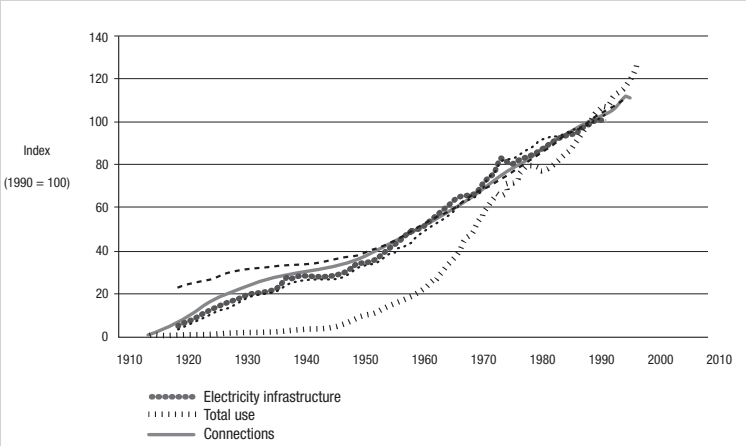


Figure 9.3 Electricity infrastructure, total use and connections (indexed for the year 1990). (Taanman 2004)

From this perspective, the transition reached a stabilization phase by the end of the 1960s and the beginning of the 1970s, characterized by a long period of optimization (in this case an increasingly efficient use of the existing infrastructures and resources). During this period the acceleration slowed down because of a number of factors. The first major development was the oil crisis, leading to the first debates on the limited supply. The environmental concerns were increasingly raised during the same period (e.g. Limits to Growth (Meadows 1972)) and a number of environmentally benign technologies were put on the agenda (wind and solar), although in a very early stage of technological development. In the Netherlands, the ever-growing consumption with its associated side effects (waste and energy) led to increasing public and political pressure and ultimately to the first generation of environmental policies (Grin et al. 2003) and energy saving measures. By the end of the 1980s, the Dutch energy system became increasingly unstable because of economic decline, rising prices and a diminishing capability and authority of the state and top-down policies. Currently, the Dutch energy regime structure has the same basic energy structure as in the 1980s. Although many alternatives for energy production are present, the dependence on fossil fuels is still strong.
From a transition management perspective, it seems clear that an overall strategic transition management has been absent. The drive for the historic energy transition was (economic, population) growth and technological development. At the level of sub-systems, the management and governance has been far more explicit. The example of the transition from coal to gas in households is perceived as an example of successful transition management. The policies for development of other sub-systems were 'managed' by the market and market forces in various sectors. Although for example the development of road infrastructures was planned, it merely followed (and still does)

the autonomous growth of mobility and consumer behaviour. In some cases, the 'management' actually failed to deliver, for example in the nuclear energy system and solar- and wind-energy. The wrong choices were made, timing was bad or the state of knowledge and technology was insufficient. All in all, more failures than successes have been achieved so that new governance strategies to deal with the energy system evolved more and more toward liberalization and stimulation of innovation through subsidies.

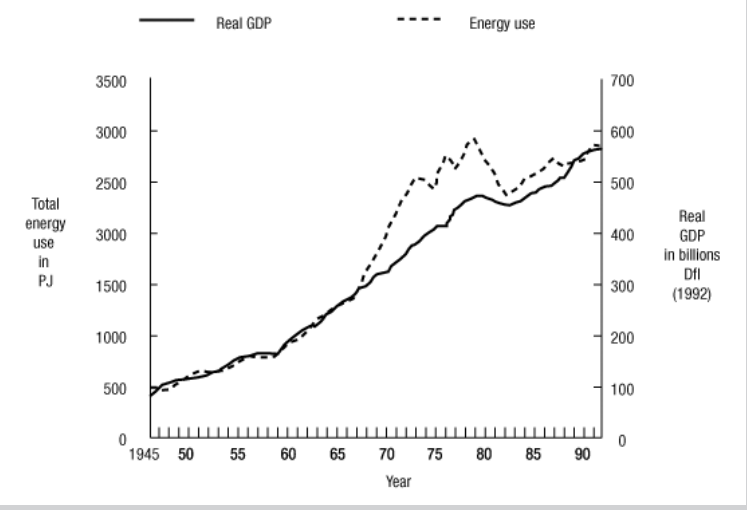


Figure 9.4 Relationship between energy use and gross domestic production (GDP) in the Netherlands, 1946-1992 (based on CBS statistics)

During the 1990s The Netherlands witnessed large-scale privatization and internationalization of our energy system resulting from pressures from European and global levels, from energy-companies and the dominant political culture of the time. Macro-level developments such as the depletion of oil-resources, attention for sustainable development and new institutional arrangements such as Kyoto could trigger further changes and ultimately a take-off towards a new state of the system. Contrary to the described historical transition, the future transition will require much larger scale changes in terms of infrastructures, practices, culture, markets and institutions. Where the historical transition was mainly driven by population growth, economic progress and technological development, the drivers for the expected future transition are a lack of fossil fuels, climate change and rapid development in countries such as China and India. The historical energy transition as well as the need for a new energy transition is illustrated by the graph below. This shows the enormous growth in production (also as indicator for consumption).

Debates upon future developments in energy production and consumption are highly controversial. The amount of resources and the expected growth in consumption are so uncertain that hardly any agreement on future scenarios

is possible. Projections and forecasting exercises can therefore only function as means for discussion, raising awareness, exploring alternative strategies and so on. One of the controversial theories regarding depletion of natural resources (such as oil) was developed by Hubbert. He defines three basic laws:

- Production starts at zero;
- Production then rises to a peak which can never be surpassed;
- Once the peak has been passed, production declines until the resource is depleted.

Indeed, we see that historically production trends show a stabilization of production growth (see Figure 9.5). Clearly, the availability in the future is highly uncertain, but only few people doubt that a production peak will arrive somewhere in the next decades, which has huge implications especially for western economies and industries (Cavallo 2004).

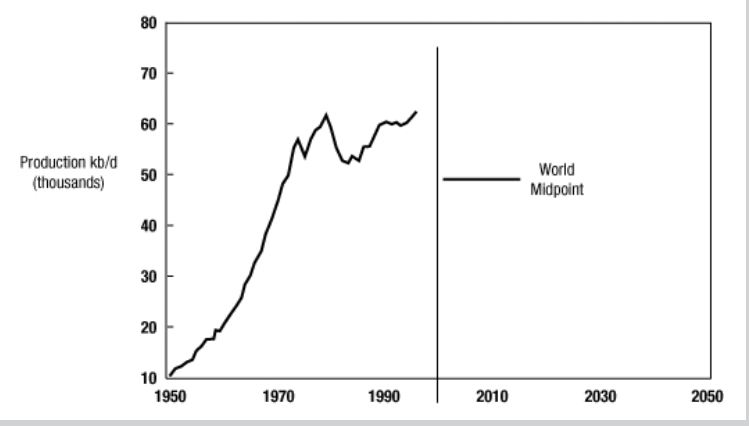


Figure 9.5 Oil-production growth

From a complexity perspective, the drivers inevitably will trigger a system transition, although from a socio-technical perspective questions are raised to the radical innovation potential of present day niche-innovations (Verbong and Geels 2006). However, the complexity perspective implies that because of changing conditions, the potential for new niches to emerge increases as does the possible impact of innovations because of the difficulties that arise in the regime. This would imply that we are in a pre-development phase of a new transition, which is associated with increasing innovation activity as well as crises within the existing structures (such as failing power-grids, energy-conflicts, bankruptcies etc.). The moment of take-off is difficult to foresee, but could possibly arrive within the next ten years based on the increasing activities on the landscape- and niche-level and tensions within the current regime that is now taking the possibility of a transition more and more seriously. However, such a prediction is always contested and take-off could be more than 10 years away (Verbong and Geels 2006). But even when the take-off

phase arrives, it is by no means certain that when the system enters a re-configuration phase, a sustainable energy system will emerge. Moreover, without strategic governance and a concerted effort it is more likely that economic and individual interests will dominate. What is therefore needed besides the integrated analytical perspective, is a reflexive governance approach that combines reflection on a societally desired sustainable energy system with an incremental, learning-by-doing strategy.

Box 9.3 The Dutch energy system – a rough transition analysis

The question is for how long the Dutch energy regime can maintain its internal organization, while it is embedded in a changing macro-energy landscape: strongly increasing global energy demand, the Middle-East conflict and uncertainties about climate change and market development lead to high oil and energy prices. Over the last decades there has been a growing awareness regarding environmental issues and the necessity to save energy. However, energy consumption is still rising because of economic growth on both national and international levels. Population growth accelerates this increase. The scarcity of available resources furthermore adds to the pressure on the existing regime. This macro-pressure is accompanied by bottom-up micro-development of alternative energy resources. Technological innovations range from wind- and solar technologies to heat pumps, co-generation, hybrid vehicles and hydrogen applications. On the production side new approaches are developing, such as industrial ecology, increasing energy efficiency, increase in sustainable energy produced through waste- and biomass-treatment methods (e.g. incineration, digestion). A large number of decentralized, small-scale energy solutions are developing (manure digestion for example), that so far have remained niche-level developments but that seem promising in the light of increasing pressures on the regime (Raven 2004 95). On the consumption side, energy saving measures have mainly been implemented in housing. The past few years new concepts such as collective energy provision and the consumer-as-energy-producer have emerged. These could make a potentially big contribution to a sustainable energy system. There seems, however, to be a barrier for the numerous technological and other innovations to penetrate the regime. Bio-energy, sustainable energy technologies like wind and solar and energy saving policies are marginal in the context of regular energy policies and dominant technologies, while research suggests that there is much more potential that could be realized with a much more concerted and differentiated policies (Hoogwijk 2004).

The current dynamics in the energy system can be visualized as in Figure 9.6. It represents the current regime that is challenged by various sorts of innovations and niches. Not only new technologies, but also alternative visions, approaches, lifestyles etc. put pressure on different parts of the current regime. Combined with external, landscape, developments, there are increasing possibilities for breakthroughs at different levels. The figure also captures the different sorts of niches: some are within the regime (for example alternative technologies are already adopted, wind- and solar-energy are already part of the portfolio of major energy companies) and some are outside the regime (alternative,

decentralized systems, transition management for energy, new approaches, and awareness). Although this analysis is only very sketchy, the main message is clear: dealing with changes in the energy system will require long-term efforts, innovation in all dimensions and at all levels and intelligent strategies in which these process and substance-requirements are met.

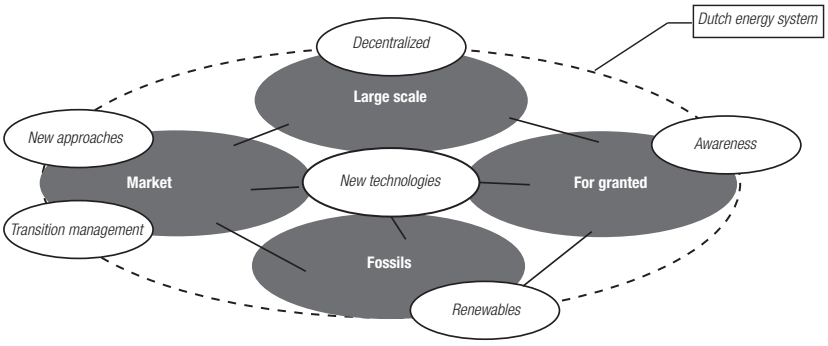


Figure 9.6 Sketch of the energy system

In this context, energy transition management could be defined as 'a long-term collective societal innovation process to realize a radically different energy system based on a common definition of sustainability'. Instead of either a planning or a market approach, transition management would include both strategies along with a society-based type of governance (Energieraad and VROM-raad 2004). Setting it apart from regular energy and innovation policy, the focus of energy transition management should be on the energy system as a whole in a much longer time-frame. This is the first complexity based management strategy that enables a more fundamental reflection on the nature of the current problems and a more integrated and comprehensive vision on the desired direction of development. A thorough (integrated systems) analysis and understanding of the dynamics of the energy system should be the basis for governance. This means not framing the problem of creating a sustainable energy system in terms of market efficiency of ecologic impact only, but seeing the necessary transition to a sustainable energy system as a societal process that includes a whole range of changes and thus the whole of civil society. When the problems related to energy are framed this way, the door is opened to much more inclusive participatory processes, more in-depth problem structuring, critical self-reflection and more targeted use of (policy) instruments and experiments. This approach stimulates the awareness that this transition will require a transformation of the existing regime (especially the routines, institutions, policies and behaviour) that is fundamental but will not automatically lead towards a sustainable energy system.

When evaluating the preparation phase of the EA energy transition process, it seems that the importance of both an integrated systems analysis of the energy system and its history as well as fundamental reflection on the sustainability problems in this system has been underestimated. The reason for engaging in transition management was primarily the interest in creating sustainable energy

business by stimulating innovation. This is reflected by the large representation of business and industry in the energy transition and a relatively low involvement of science, intermediaries and NGOs in the process (see Figure 9.7). In practice, this has definitely led to a public-private process in which a number of coalitions and projects have been developed, but these are still somewhat in line with regular innovation policies that stimulate specific technologies and experiments. Transitions or even system innovations have hardly been actively pursued; the main focus has been on transition paths and experiments (see: Taskforce-EnergyTransition 2006). No fundamental questions were raised regarding the current regime, consumption, dependence, equity or power. In the scenario-study, different futures were explored based on present day trends. This provided the basis for a selection of themes, but did not lead to very innovative, inspiring, imaginary futures that included radical changes. On the process-side, the problem analysis and the scenario-process were not participatory. The ministry did consult the sector to assess the support for the approach but the demarcation of the issue, the selection of stakeholders and the selection of sub-themes was done by the ministry itself, based on the scenario-study. From the perspective of transition management, this narrowed down the scope of the energy transition process and its substance: related factors, processes and developments have been ignored and so other types of actors and actions have been left out. Examples are consumers and their behaviour, alternative societal visions on infrastructures and use. The lack of attention for social and consumption issues related to the energy transition thus stems from the lack of participation and the limited scope of the analysis in the preparatory phase. Partly because of this, a fundamentally new paradigm or perspective for the transition has not emerged so far.

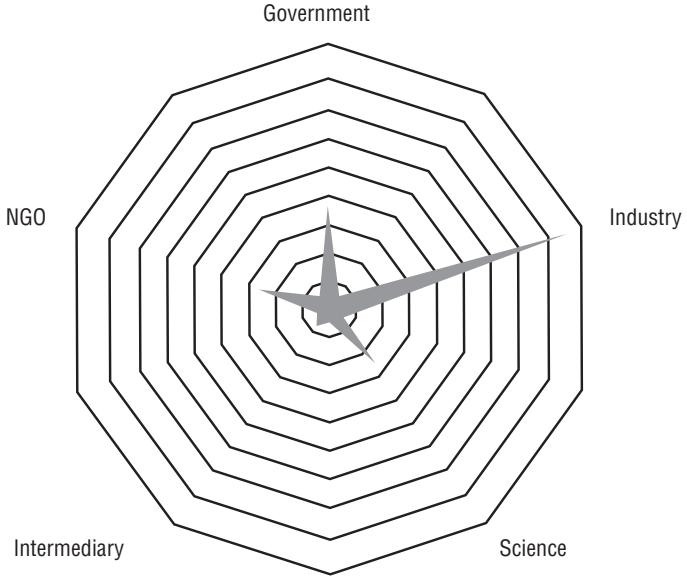


Figure 9.7 Taskforce and Platform members and their organizational background (Figure provided by Roel van Raak)

In the current predevelopment phase of the societal energy transition, transition management needs to create room for innovation and convergence of existing initiatives towards a shared overall ambition. By creating a shared sense of urgency and sense of direction, alternatives can be developed at the strategic and tactical level before the take-off phase is reached so that sustainable alternatives are present. So far the main level at which alternatives are developed has been the operational level (and perhaps the tactical level) where transition experiments are developed and funded. Although the experiments also involve societal and institutional aspects, they are still insufficient to amount to a fundamental debate, let alone change, at the level of societal culture and structures. Developing strategic and tactical transition management means that at the strategic level, societal frontrunners, leading pioneers (not only from energy) and opinion makers should be engaged in a societal debate about the fundamental problem as well as about what would be considered a sustainable energy system. This could induce a broader public interest and participation in the problem-structuring process, something that is undoubtedly important for development of support for measures, creating awareness and involvement (Van de Kerkhof 2004). The primary task of such a transition arena towards society should be the communication of the necessity for fundamental change and a desired direction for such a transition to their respective networks and professional environment. At the tactical level, coalitions and networks should be developed that involve innovative individuals from regime- and niche-organizations. At this level, experiments should be focused on new enabling structures and the transformation of existing structures to support alternative visions and facilitate experiments at the operational level.

In the practice of the energy transition, the strategic level had been underdeveloped for the first few years and only in 2006 a new group, the Taskforce, was established. This Taskforce, however, does not meet the criteria for a strategic transition arena, because of three reasons: the individuals involved were selected based on status, representation and power; the substance of their message was to reduce transition to numbers and a business as usual+ scenario; and the underlying process of envisioning did not include strategic actors nor did it explore radically different futures. The Taskforce does create space at the strategic and tactical level by drawing attention to the issue, putting it on the political agenda and signalling the possibilities for creating sustainable energy business, but it does not escape a traditional role of advisory board asking the government for measures and policy. A real transition arena is an instrument for societal steering that develops strategies in which the government is part but not always the necessary condition: it catalyzes and stimulates societal solutions and activities rather than offering recommendations only. The focus on regime-actors and business combined with the governance approach that is still based on a more or less traditional relationship between government, business and science is also present at the tactical level. It is reflected in the composition of both the Taskforce and the different platforms (see Figure 9.8), where an institutionalized, large-scale and regime-associated organization dominates the process (Hofman 2005 227-228).

The individuals involved in the Taskforce are predominantly regime-related actors and the group is chaired by the CEO of Shell Netherlands. Although such a group can have an impact on political agendas and raise awareness concerning the issue, they are unable to develop alternative visions that would oppose the interests of the present day regime. This is reflected by their 'vision' for

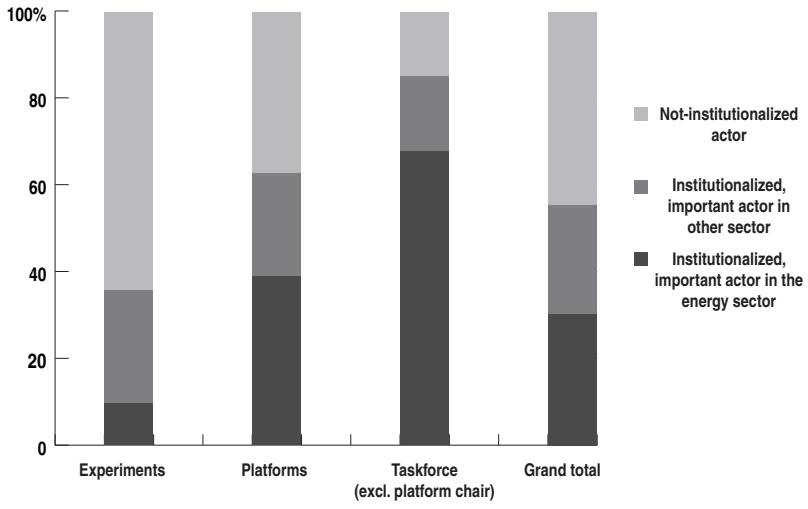


Figure 9.8 Actor-composition of the energy transition process (Figure provided by Roel van Raak)

the energy transition (Taskforce-EnergyTransition 2006), which is quantitative (instead of qualitative), based on CO2 reduction (instead of 'full' sustainability) and based on the assumption that the current structures will remain in place and the transition will be one of gradual improvement (which can be considered to be no transition at all). Obviously this is a vision in line with the interests of many regime actors (and functional for incrementally improving the sustainability of the regime), but it is not sufficient for a transition. A sceptical reader could interpret the energy transition vision, which is laid on top of the documents produced by the various platforms, as a business-as-usual scenario with an emphasis on increasing the contribution of sustainable resources. The vision holds no inspiring ideas about different types of networks, other types of use or practice, new institutional or regulatory possibilities, other technologies etc. In part, this is explained by the composition of the Taskforce and platforms (see also: Hofman 2005 226-228). For another part, this has been the result of an envisioning process that was not based on open, bottom-up and creative processes, but based on forecasting scenario exercises and on quantitative calculations about reduction-percentages aspired by the different platforms. Instead of building on the substance of the ideas developed in the platforms and integrating core principles, ambitions and goals formulated at this level into an overall strategic vision, the vision only contains a selection of 'feasible' projects and transition paths that are as concrete as possible and overall goals. A true transition vision should create room for innovation, debate and change, mobilize and inspire actors, but the Taskforce vision could achieve the exact opposite because they did not involve or inspire the broader public, shifted the responsibility for the transition back to the government and focused heavily on technological innovation and optimisation.

Apart from the missed opportunities regarding strategic transition management, the Taskforce did achieve two important results at this level. The first result is that they raised awareness especially within the policy arena that energy transition takes time and requires a consistent policy that transcends political short-term cycles. 'Energy transition' has since then become adopted by various political parties and the need for policy-consistency is widely acknowledged. This has led to debates upon current policy instruments, programmes and regulations and how these should be adapted to and implemented in the context of the energy transition. Examples are financial R&D instruments, long-term agreements with various sectors or a fixed minimum yearly budget (the Taskforce estimated 1 billion euros a year). The second, more indirect, result was that the weight of the individuals involved in the Taskforce sent a clear signal to the energy sector in general that the energy transition process was an interesting, important and serious process. The interdepartmental IPE is also a promising development at the strategic level, which could lead to integration and innovation of policy. In transition terminology we could consider the IPE a transition arena for governance, because it reflects upon the role of government in transitions and how this role could be fulfilled as best as possible. It remains to be seen, however, to what extent the IPE can really achieve change within the different Ministries involved and in how far they will gain support for their ideas and proposals in the political arena, in business and among NGOs. In a sense the IPE also remains closely tied to the regime and therefore probably unable to really promote bottom-up radical change.

While at the strategic level only recently new developments have started, the ministry has been first and foremost interested and involved in tactical and operational transition management. At the tactical level energy transition management should focus on defining the necessary changes in the systems structures: regulations, institutions, networks and infrastructures/technologies related to the overall defined vision and ambitions. New coalitions and innovation networks should be stimulated around a joint societal transition agenda which includes a variety of transition paths and experiments. Network- and process-management can be used to stimulate this process. Evaluation and adaptation should be an integral part of the process following the complexity based management strategy that objectives need to change over time as society changes. With regard to the development of coalitions and networks at the tactical level, very concrete results have been achieved in terms of the amount of actors involved in the process (from around 10 in 2000 to several hundreds by the end of 2004), the amount of multi-actor coalitions formed and supported around specific energy options (over 75) and the amount of societal groups engaged and societal debate stimulated. This has also led to initiatives taken up by societal actors themselves, cooperation between environmental NGOs and business, and projects between municipalities, technology developers and local businesses. There thus seems to be a constant interaction between societal dynamics, steering activities and the way in which policy-development is taking place, leading to all sorts of spin-off both in terms of traditional results such as reports, voluntary agreements and projects and in terms of network-development, (policy) learning, behavioural change and redirection of existing trajectories (mainly investments). Although these numbers show increased activities, they are not the only indicators for innovation and learning at this level. What is really needed are new combinations and proc-

esses of social learning (leading to changes in structures). The prime examples hereof such as the Heating Company and the Energy-producing Greenhouse already existed and have only been taken up in the energy transition process. So far the experiments funded have included some new coalitions, but they are predominantly still very technological and focused on concrete results.

In terms of agenda-building, a set of ultimately 21 transition paths has been developed in the context of the different platforms based on their respective visions. The process of developing the transition paths was in itself a learning process, in which initially all (primarily technological) options were regarded as a transition path; it was only through debate, restructuring and negotiation that a common perception emerged on what a transition path was and should include. The transition paths were first acknowledged by the ministry as a basis for selection of experiments and related funding. In their report, the Taskforce also included the 21 transition paths in their report, explicitly presenting it as a portfolio strategy that could only produce concrete results over time. The transition paths have so far primarily been oriented toward possible promising new technological systems and do not yet explicitly address all sorts of institutional societal and cultural issues that are related to the specific system. The portfolio of transition paths does function as a guiding strategy, but the danger is that by formalizing the transition paths as a basis for investment, regulation and policy decisions, they become a goal in themselves instead of a means. In transition management, the transition paths function as tools to reflect on necessary changes between vision/images and experiments and through that reflection reframe the challenges perceived. In this way transition paths are a means to reflect continuously upon and reframe future challenges as an instrument for social learning. By structuring the process around formalizing transition paths and developing experiments that fit the paths, the focus is on producing output and concrete results, rather than on searching- and learning-processes. Because so far there has been no systematic and structured social learning process and documentation hereof (through setting learning goals at all levels, regular evaluation, transition monitoring and an emphasis on the experimental nature and learning outcomes rather), the dynamics towards more or less regular innovation processes and policies is enhanced.

The debate at the tactical level should focus more on the conditions under which different options are regarded as 'sustainable' and under which frame conditions the options could be realized. These frame conditions could be economic, regulatory, institutional, technological or cultural. Interventions should be based on the questions and opportunities identified here. The government should play an important role at this level: they participate in the formulation of the transition agenda and simultaneously need to revise and critically evaluate their own role and regulation (Bruggink 2006). This relates to both existing regulations and institutions that form barriers to innovation and possible new regulations and institutions that would facilitate and accommodate the implementation of the transition agenda. Timing of interventions and policy changes from a transition perspective are crucial. This can be illustrated by current debates about further liberalization, the role of sustainable technology subsidies and awareness campaigns within the context of regular policy. Based on a possible transition agenda, the critical questions would be whether there is still a need for collective infrastructures, whether liberalization will lead to sustainabil-

ity, what the role of innovation and energy policy is in the context of this transition and whether current regulations and market conditions are preventing or promoting a breakthrough of sustainable energy infrastructures. Such liberalization processes are disrupting the usual organization, which can cleverly be used to introduce innovations. Especially for newcomers the opportunities are there during periods of disruption. Such issues need to be put on the political agenda but they should also be part of societal debate. Although some initiatives of the ministry aim to address more fundamental cultural issues and institutional barriers (like the Trendsetters' Desk), the attention to these issues in the context of developing transition paths as well as the platforms and networks has so far been insufficient. Not only should the ministry take on a modern governance role as facilitator of societal innovation, it should also offer possibilities for evolutionary developing and modernizing their own bureaucracy and integrating policies (Hofman 2005). The IPE could play an important role in this process.

At the operational level, the policy has been successful in addressing innovators, supporting and setting up transition-experiments (over 70) and creating attention within the energy-related community. A number of concrete successes such as the Heating Company and the Energy-producing Greenhouse illustrate that. There have been, however, few activities directed at involving consumers, the wider public and other actors (such as SMEs). The recent developments of linking up different transitions (a.o. through the IPE) and re-evaluating the past period are promising in this regard since they indicate a growing awareness that public support is not only a necessity for policy, but also a condition for a transition to occur. In terms of the diffusion of ideas by involved actors towards their own professional environment, it is hard to assess how much progress has been achieved, but it is clear that more systematic transition oriented strategies could provide a more strategic character to the experiments (Raven 2004) and increase the chances for broadening and up-scaling of the experiments (Kemp and Van den Bosch 2006; Van den Bosch and Taanman 2006). Another tension underlying the struggle to move beyond regular innovation projects is the mismatch between the composition of the platforms and the societal frontrunners involved at all societal levels in sustainable energy. The innovators that asked the Trendsetters' Desk for help, for example, were not the members of the platforms or the actors involved in the projects. It has obviously been difficult for both the ministry and individual platforms to get in touch will real innovators in the energy field, or to develop strategies and agendas that are interesting and promising enough to involve these innovative outsiders. It seems that the attunement between the different levels of transition management both in terms of substance and process is absent: because a process architecture is missing, there is no convergence between vision, images, paths and experiments, nor is there a convergence between innovative regime-actors and innovative outsiders.

It seems that most actors involved were already working on the subject of sustainable energy and did not develop radically new ideas or approaches that they could translate to their own environment. However, it is clear that through funding of projects, media attention for the process and in general an expanding process and agenda, involvement in the energy transition process is becoming more interesting in many respects and is taken more seriously. The results in every-day practice have therefore not been very visible so far, which is not surprising because the process is still very recent. There are some minor changes

in the structures of the regime such as new or changed regulations (OTC, UKR) and the Trendsetters' Desk, but in general the dominant routines, practices and culture have not fundamentally changed. The policy process in general has become more open, especially for innovators, but dominant players are still the energy companies (environmental NGOs, scientists and various governmental organizations are involved in it in a collaborative way) and the focus is still predominantly on technological innovation (Kemp and Van den Bosch 2006). In a general sense, the community building, the expert discussions set in the context of the larger societal issues and the commitment of the Ministry of Economic Affairs to the process have set the conditions for convergence in the thinking about sustainable energy. It created an increased sense of urgency (with regard to government and NGOs) and increased sense of opportunity (for business, but NGOs as well), but still within the context of sustainable energy related actors. For example, the attendance at the presentation of the Innovation in Energy report, which presented the outcomes of the first phase of transition management, illustrated the growing attention of the regular policies and politics for the approach. Initial scepticism regarding the approach has waned, the Minister himself has shown great commitment and there is much discussion going on about the concept of transition management.

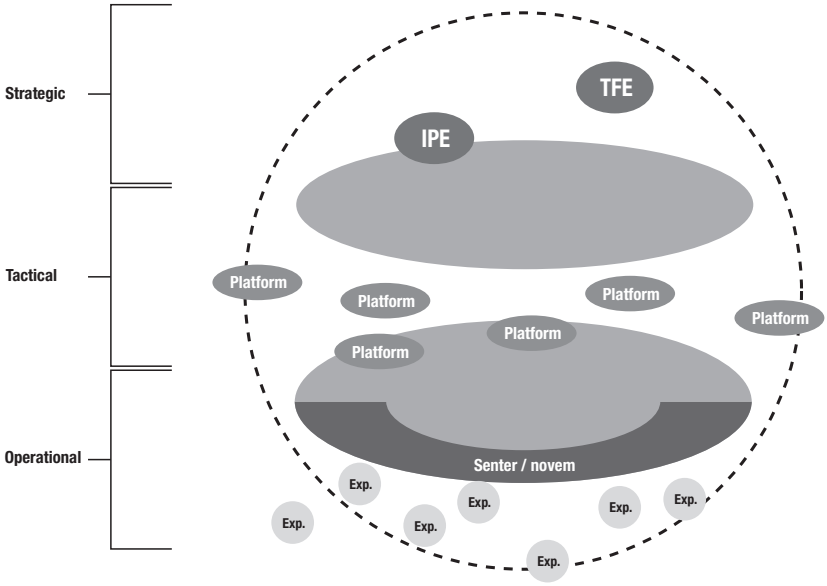


Figure 9.9 Emerging sustainable energy governance system

Overseeing transition management at different levels, it seems that a multi-level governance system is emerging that could bring convergence to the field of (sustainable) energy policy through process coordination and shared agenda-building (see Figure 9.9). This system could evolve further to become a truly adaptive and anticipative system, but it is still fragile in the context of the powers, (economic)

interests and interdependencies of the regular energy regime. There are currently two main barriers to further development of energy transition management to become a real transformative power: the process architecture and the substantial agenda. In terms of process architecture, the actor strategy along with the multi-level governance approach should be the basis for energy system governance. The energy transition process should involve a broader scope of actors (at all levels) and at the same time focus more on innovators and frontrunners, often in niches. The process architecture should take into account the attunement between the different levels of governance, especially the coherence and iteration between vision, images, paths and experiments. This directly relates to the substantial energy transition agenda that should explore radically different futures and visions and connect these to short term experiments. The energy transition agenda should focus on social learning as a goal in itself, meaning that in fact the awareness of all individuals in society regarding the energy transition and available alternatives is stimulated. Only by combining the process and substance-strategy into integrated systemic governance, can the conditions be created for emerging new structures, surprising breakthroughs and new combinations. Such an approach should be possible based on the current energy transition process, since the ministry as well as the actors involved have demonstrated a capacity to learn, adapt and innovate, and the ability for strategic governance. Further development of the energy transition process will depend on the capacity of involved actors to continue along this path without becoming part of regular policy or becoming a project in itself, detached from reality. A more systemic and scientific approach towards transition management and complexity could provide a very valuable contribution to this evolving process.

9.4 Conclusions and lessons learned

The transition management approach is used in the energy area for both economic reasons and environmental reasons: it is believed that an innovation-oriented approach helps to create energy business. The fact that energy policy and innovation policy are the responsibility of the Ministry of Economic Affairs was a factor here. Transition management allowed the ministry to pursue its innovation agenda. Business creation in the name of sustainability is thus an important element but there is a genuine belief that sustainability requires system innovation and a different policy approach, which is the second reason for adopting transition management. A third reason is to make policy more open (new government-business relationship, reflecting a new view of the ministry's own role). Thus, the energy transition process has been developed in line with the regular innovation approaches, but analytically structured based on transition management leading to a longer-time horizon, a more explicit focus on sustainability and the development of transition paths.

The Dutch energy transition approach is innovation-oriented with long-term images guiding transition experiments, but very much top-down in the sense of first developing conditions for experiments and then selecting projects. Various transition paths are explored simultaneously to avoid lock-in to certain paths, but these transition paths are almost seen as goals in themselves rather than means to create societal coalitions and stimulate searching- and learning-proc-

esses. In doing so Dutch authorities still seem to rely more on the 'intelligence' of planning than on processes of variation and selection. A mechanism of self-correction based on policy learning and social learning is part of transition management, but is developed on a relatively small scale and in an unstructured way. Much more room should be created for structuring, reflecting upon and evaluating social learning. This could also be achieved by experimenting more on strategic and tactical levels in terms of new visions and structures, while at the same time utilizing learning methodologies and documenting learning processes.

Contrary to regular energy and innovation policies, transition management is based on unpredictability, uncertainty and complexity of future development. Transition management also explicitly starts from the ambition of sustainable development, without defining its specific meaning. Regular policies in the Netherlands predominantly focus on optimizing existing structures, financing 'promising' innovations without an explicit link to an overall objective, and executing and enforcing existing environmental regulations. Vision, ambition and a basic notion of steering and 'soft planning' (Kemp and Loorbach 2003) are absent in the context of market-based policies. Illustrative are the existing financial programmes for stimulating energy innovation. These instruments are predominantly based on technological innovation and the government plays a very passive role in this. Integrated policies are virtually lacking, energy saving is not really stimulated and integrated analyses are not made. A major insight from the efforts concerning the energy transition has been that the transition approach and the transition arena are at a meta-level instruments to *transitionize* a regular policy context. The energy transition started out as a small scale, experimental process, and has since then overcome scepticism and conservatism leading to changes within the ministry and regular energy policies. Although this in itself is a major achievement, there is much room for improvement of the process in order to realize a larger impact on society and energy policy in general. The improvement can mainly be achieved in terms of more integration of policies, more structured process management, a more substantially based notion of sustainability and the related vision and finally the translation of transition agendas to regular policy.

Transition management offers a framework for policy integration through a multi-level governance approach. In practice the integration between the activities at different levels in terms of process and substance, has been insufficient so far. Although the ministry did achieve more cooperation and dynamics, it did not succeed in creating self-organizing processes and enlarging the chances for spontaneous and surprising innovations. Realizing that the first five years of energy transition management have been experimental, it is obvious that the evaluation of energy transition management should be interpreted as input for the coming years. The progress made so far in terms of building agendas and coalitions is promising and the learning experiences themselves are unique in the world. Whereas other countries are engaged in managing transitions in an implicit way, the Netherlands did so in an explicit way. The commitment to transitions allows for cooperation between Ministries but also for making political choices which are needed for bringing production and consumption closer to sustainability. It is not a substitute for politics but a new framework for governance, and as such the energy transition process is a unique policy experiment because a new mode of governance has been developed and implemented based on scientific concepts.

At the national government level, it is underestimated what the importance of transition management could be for policy innovation in general and that as a policy experiment it could possibly become a new (policy-) export product in the international arena. This would require much more systematic reflection and documentation of the learning processes and a more active effort to communicate and translate the experiences.

An important aspect of the innovative potential of transition management is its possible influence on regular policy because it is explicitly positioned as an experimental programme. The *transitionizing* power of transition management is also evident in this case, although the precise effects and the efforts and activities undertaken to influence regular policies remain largely hidden. The ministry has been struggling to develop transition management in the context of the existing energy policy regime, which has led to critical questions regarding the functioning of the (policy-) regime and efforts to remove barriers in the regime. Illustrative is the unclear diffuse link between the energy-transition policies and the regular energy-policies. While in the transition networks a vision is emerging based on different options for production of energy, the government is following a market-based strategy of privatization of energy companies. The interface between transition policies and regular policies (especially regarding the underlying paradigm and long-term ambitions) is the nexus where progress in terms of policy change and integration can be achieved. While so far all energy has been directed to the policy experiment of transition management and the focus has been on organizing platforms, developing visions and agendas and starting up experiments, the focus now has to shift towards utilizing the critical mass that has been built up to influence regular policy. By now, enough confidence and trust have been built up in each-other, in the strength of the process and in the possibilities for transition. It is clear that the ministry, while simultaneously continuing active management and coordination of the various transition arenas, now needs to take the next step in *transitionizing* energy policies.

Chapter 10

Synthesis and outlook

10.1 What can we conclude?

This thesis integrates an inter-disciplinary analytical approach (the transition management approach, Chapters 3, 4, 5 and 7) with a prescriptive model (Chapters 5 and 6) and a reflexive evaluation of both (Chapters 9 and 10). The research approach underlying this thesis was a combination of more traditional and more innovative approaches and methods. Through iteration between research and practice, theory was enriched and methodology developed and tested. Based on multi-disciplinary literature studies, inter-disciplinary scientific debates and development of new concepts, the transition management approach was grounded, further developed and conceptualized. The transition management starting points were redefined and complemented with new insights from practice. We theoretically developed the transition arena as an instrument for transition management and experimented with the model in practice. A methodology for the transition arena emerged from various experimental processes and projects, based on the transition management approach and the transition arena model. Finally, we reflected upon the experiences with the transition arena model (Chapter 8) and transition management processes based on the approach in general (Chapter 9).

We have shown in this thesis that, although theory and practice of transition management are in a relatively early stage of development, it is possible to ground transition management scientifically as a new governance approach and to implement the operational model for transition management successfully so that it actually impacts and redirects regular (policy-) processes. This will be a continuing process: as we learn more from practice we further develop the approach and so forth and so on. Nowadays our definitions of transition and transition management differ significantly from those in 2000. This illustrates the dynamic status of transition management in the sense that what has been learnt has been incorporated and led to adaptation of the underlying concept/principles. It is therefore useful to reflect upon theoretical and operational progress made in this thesis and draw some conclusions and formulate synthesizing insights regarding the future of transition management in the context of societal innovation. We do not presume to be able to draw conclusions regarding the over-arching question whether managing transitions is possible. We are however able to draw conclusions regarding the research questions posed in Chapter 1, paragraph 4.

Governance of long-term processes in society

One of the major challenges undertaken in this thesis was whether it would be possible to develop a theoretical approach to governance for long-term (one generation or more) complex processes in society (sub-question A). This is an area not addressed by policy and political science, possibly since a general consensus around the role of policy and government amongst both researchers and policymakers seems to be that such complex processes are in fact unmanageable. There is however, as argued for in Chapter 1, a clear need for new approaches in this area. In Chapter 3, the basis for what we term 'complexity based governance' is being defined based on similar and complementing insights from three different scientific disciplines: complex system science, sociology and governance studies. Based on inter-disciplinary and deductive reasoning, a number of basic start-

ing points were defined for governance strategies to deal with complex, long-term processes in society. In this chapter, we have shown that a coherent and well-founded conceptualization of such an approach is possible by systematically identifying insights that relate directly to either our understanding of how transitions occur or how they are and can be influenced.

Chapter 3 offers the starting points for the development of various governance approaches of which only one has been further developed (e.g. for transitions to sustainable development). Arguably, these starting points can also be used to develop governance approaches for societal systems and problems in general, also for which no transition is required. For example, systems considered already sustainable could be kept adaptive and anticipative using complexity based governance, or newly emerging systems could be guided towards sustainable states through early anticipation and increased reflexivity. For this the definition of complexity based governance given in Chapter 3 is, by necessity, too limited in scope. Possibly important insights from the used disciplines are ignored and other relevant disciplines (such as psychology, business, law etc.) are not included. Although this has been a conscious choice for this thesis, it seems clear that the basic approach sketched in Chapter 3 could be further elaborated and underpinned through use of insights from other disciplines. In part, this is already taking place indirectly through numerous transition research projects (see also next paragraph), but both the perceived lack of theory and approaches in this area and the concrete suggestions for such an approach in this thesis should be subject of further inter-disciplinary study and debate.

Governance for transitions to sustainable development

The transition management approach was defined in Chapter 4, based on initial ideas for transition management, the inter-disciplinary concept of complexity based governance and the concept of sustainable development. The integration of the concepts of transitions and sustainable development into the theoretical approach to long-term governance allowed us to answer research sub-question A more precisely. Based on theoretical considerations, it is possible to formulate a long-term governance approach based on generic starting points, but the ambitions of control and influence are modest by necessity. Also informed by the historical policy developments and decades of theory around governance and complexity, we have to acknowledge the inherent uncertainties and uncontrollability of social change on the one hand, while also emphasizing the possibilities for small-scale action and experiments to influence long-term development. In elaborating this tension between grand visions and small actions, a compromise had to be made between achieving as much integration as possible and being limited in time and space in the specific application of complexity based governance to achieve transitions to sustainable development (Chapter 4). By choice, transition management is in Chapter 4 primarily linked to analytical governance and policy-concepts and a limited number of process-management approaches. This means that insights form potentially relevant other fields, such as organizational science, learning theories and business management are not included. Without addressing all details, elements and theories to which transition management can be linked, we did outline how transition management is positioned in the broader historical development of policy (and its place in society) and in the wider field of governance studies, process management and policy sciences.

Based on this, we can conclude that the transition management approach does fit within a wider development in thinking about how society and society's problems are dealt with. Increasingly, both central planning and liberalization strategies are seen as insufficient to address complex problems related to sustainable development. In modern society this leads to forms of multi-actor network- and process management in general referred to as governance. Transition management is shown to build on insights and approaches from different governance theories and approaches, but also introduces new elements and is therefore distinctly different from previous approaches. Besides the focus on long-term structural societal change, the main differences between transition management and existing governance and policy approaches are: its explicit analytical basis to structure the process (complex system thinking and transitions), the coherent theoretical basis for the governance strategy (the transition management approach), the selective and structured participatory approach (based on the transition management framework) and the emphasis on informal rather than formal policy and governance processes.

Transition management framework

As a basis for actually implementing transition management in the form of structured governance or policy processes we have developed the transition management framework as presented in Chapter 5 to answer research sub-question B. The framework distinguishes between three different levels at which societal systems are influenced: a strategic level of ideas, opinions, visions and concerns at the general level of a societal system voiced by individuals; a tactical level of rules, routines, institutions and infrastructures at sub-system level that are influenced by representatives or employees of various organizations; an operational level of innovations, investments, daily activities and practices undertaken by entrepreneurs or small organizations. Based on the transition management approach presented in Chapters 3 and 4, we were able to link each level to specific goals, activities and actor capabilities. The framework this way can be used for analysis of *ex post* transition management, as shown in Chapter 7 on the waste transition (research sub-question C). By using the framework as analytical tool, we were able to distinguish the interplay between developments, activities and changes at different levels of scale and show that a transition took place. Even more, we were able to identify how this transition was influenced in terms of transition management and in doing so drawn important lessons regarding the possibilities and difficulties for governance in the context of such a transition. An important insight that stems from ex post analysis of transition management in the context of various transitions is that transitions evolve in different ways and that there thus is no single recipe or blueprint for management of transitions.

The transition management framework is however based on the observation that different types of governance activities and types of processes that seem to be part of any transition and transition management can be distinguished. This framework provides the basis for developing networks and defining instruments for transition management (such as the transition arena, transition visions and transition experiments) that already ongoing structure transition management processes. The different transition management instruments are directly linked to the three different levels in the transition management cycle. This transition management cycle provides a more concrete elaboration of the framework

that can be used to develop and structure specific projects. Based on analysis of a system and its problems, a specific operational form can be developed that would be most effective in that situation. Depending on the phase of transitions, strategies might be developed that start by developing networks and coalitions to develop transition agendas and promote institutional change, by broadening and scaling-up experiments and mobilizing actors, by a (system) evaluation and reflection upon earlier defined goals and ambitions, or by setting up a transition arena to develop experiment. Based on both the theoretical underpinning as on practical experience, the transition management cycle has evolved to its current form. Although it remains a very broad framework for management, we have concluded that it is not only useful in very different contexts, but can also be the basis for innovative and integrative governance projects.

Transition arena

The usefulness of the transition management approach is illustrated by the cases described in Chapters 8 and 9, but also by various other transition management projects to which has been referred in this thesis (for example the intermezzo and the waste management example in Chapter 7). Out of these experimental transition management projects, the transition arena model as described in Chapter 6 has emerged. The transition arena model is an effective model to structure, organize and coordinate problem structuring and envisioning processes in such a way that it leads to social learning amongst a network of innovators and the development of shared visions and agendas. It is however also clear that the transition arena is neither the only nor a perfect blueprint model, but does provide a solid basis for actual implementation of transition management. A significant result of this thesis is the developed methodology for the different process-steps integrated in the transition arena model. In terms of substance and in terms of process have the transition management instruments as identified in Chapter 5 been defined more precisely and linked to specific methods, with a specific purpose and place within the transition arena. Examples hereof are the integrated systems analysis, the actor selection based on selection criteria, the development of a transition vision and transition agenda including images and pathways, and a portfolio of experiments. The model illustrates that for the management of complex problems, a structural link between analysis/substance and the process within the transition arena is needed.

The transition arena model offers a mirror for reflection during implementation. Since the model needs to be made context-specific when implemented, a continuous evaluation, adaptation and adjustment need to take place regarding substance and process. The substantial output of a transition arena session needs to be structured in system and transition terms and developed further to provide input for a next session. Along this process the substantial output becomes more concrete, leading to changes in the process in terms of involving more and other actors, implementing other transition management instruments or involving other areas of society. Chapter 8 and Intermezzo II illustrate that implementation of the transition arena model is complicated and difficult, but can nevertheless lead to significant results both in terms of influence on an existing regime as in terms of build-up of new activities and developments. The success of the transition arena and its output is for a large part dependent on the quality of the organization and facilitation by a transition management team.

In such a team three types of actors should be represented: problem-owners (often a governmental official), transition management experts and experts on the transition topic. The success of the transition arena thus depends on a large number of factors and in that sense no unequivocal answer can be formulated to research sub-question D. However, based on theoretical development and experiences with implementation of the model, it has become clear that the basic elements of the transition arena model have emerged as building blocks for any strategic transition management project. When implemented in a successful way, this approach leads to significantly more substantial and lasting output because it is based on the intrinsic motivation of involved actors. But however diffuse and hard to measure the output of a transition arena, what the experiences do show is that it is certainly possible to use the transition management approach and framework as a basis for developing, structuring and facilitating concrete transition projects.

Reflexivity

It is clear that over the last few years, our definitions of transitions and transition management and our practices related to the transition arena model have matured. We have become more critical and accurate regarding the transition arena model: in terms of actor selection criteria, in terms of the substance of transition visions and agendas and in terms of methodologies used. At first we operated more or less intuitively in many areas, but nowadays we are able to define and execute actor selection, facilitation and analysis based on theoretical underpinning combined with empirical evidence. The actor selection for example, while at first more or less based on intense discussions with project leaders, is now structured based on interviews, a competence check and an ideal group-composition. There were also elements that we underestimated beforehand, which came to the forefront during the various transition arenas. Examples of these elements are the importance of problem-structuring, the mobilizing power of a transition agenda, the transformative power individuals can have and the impact transition experiments can have on the direction of change. Increasingly, the elements of transition management are regarded as 'systemic instruments' in their own right: through strategic transition experiments, other processes are influenced and directed and through problem structuring and envisioning processes, individuals develop the capabilities and perspective to promote changes in their own regular environment. A final important change in our thinking with regard to the transition arena is, that now much more room is created for involvement of innovative regime actors, instead of purely focusing on niche-actors. In practice (for example in the transition arena Parkstad Limburg) there had always been some regime actors involved, but it was only later that we integrated this in the theoretical approach. The transition management approach has thus been refined and adapted over time based on lessons learned in practice and vice versa.

In its core, this is what makes the transition management approach already successful: it provides a way of thinking about governance that is concrete enough for implementation but simultaneously allows enough room for reflection, adaptation and learning. When implemented, it leads to new insights, more refined concepts and theoretical development. This in turn can inform more structured or intelligent implementation, etc. In its core, transition management

is learning-by-doing and doing-by-learning. This process is even more refined than suggested in research sub-question E: implementation does not only inform theory but also the other way around; there is continuous co-evolution between theory and practice. Much like how we described sustainable development in Chapter 1, transition management defines qualitative criteria for a successful transition management process without too concrete illusions about an end-state or expectation about predictable outcomes. This allows for broad explorations while maintaining realistic expectations to be combined with small scale experiments and incremental steps forward. Basically, this approach is also a way of thinking in which limitations to control are no seen as barriers but as starting point for exploring possibilities that lack of control can offer. This potential of the transition management approach can also become a weakness: because of the unpredictability of transitions and the awareness of limited control, transition management can become regarded as an escape for straightforward action. We could say that one of the major conclusions of this thesis is that successful transition management depends on a balance between transition management and regular policies in a way that transition management inspires, influences and stimulates regular policy without becoming part of it.

To sum up, our research has gone through a cycle and now returns to the initial idea that it could be possible to manage societal transitions based on a thorough understanding of these. This thesis shows that it is certainly possible to achieve success in this area both theoretically as well as in practice. Transition management as presented in this thesis can have a long-term impact on societal systems development in terms of redirecting governance processes and in terms of restructuring and reframing societal perspectives and discourse. Based on a well-founded approach, on practical experience and a set of systemic instruments and tools, transition management offers the possibilities for intelligent learning-by-doing and doing-by-learning in governance and science. Transition management as outlined in this thesis presents a (transition) vision for a mode of governance for a complex, networked society that strives for sustainable development. Although transition management is still in an early stage of development and the approach and ideas presented in this thesis undoubtedly subject to further evolution, we do claim to have achieved a very significant, unique and promising result: an innovative scientific concept has been accepted and tested in research and policy with a lasting impact on both. It has led to a new way of thinking about societal change and the role and modes of governance already part of daily life. Based on the energy, the enthusiasm and the profound effect of transition management, it is safe to say that its development will continue for a long time. We hope that this thesis will offer a basis for further development, exploration and learning and that this process in itself will contribute to institutional change and sustainable development.

10.2 The evolving practice of transition management

We thus conclude that so far transition management has been highly successful in policy and research practice. Transition management inspired and motivated individuals to do things differently: in terms of research, where nowadays dozens of researchers from different disciplinary backgrounds operate in transition

research projects, and in terms of practice, where hundreds of professionals are involved. Various transition visions and agendas have been developed in transition arenas that influence regular policies. The number of disciplines, domains and even countries in which transition management is used still expands, underlining the generic applicability as well as the need for such a new mode of governance that is felt in society. However, transition management is still rapidly developing and there is a diversity of transition management practices emerging. It is too early to conclude that transition management is the only or even the best mode of governance for sustainable development, but since no alternatives are offered and so far no fundamental scientific or practical objections have been raised against transition management, it certainly seems the most promising perspective for governance for sustainable development. In this chapter we formulate some synthesizing insights. These insights are based on new scientific debates, learning experiences related to the various transition management processes and preliminary, but hopeful, results of these processes. Based on these insights we identify the central issues for further research and experiment. This chapter therefore builds on the preliminary conclusions drawn in the various chapters, and synthesizes the insights that resulted from this thesis. As these past few years have been only the start of our exploration of transition management, we here sketch the outlines of the future transition management research agenda.

In the historical development of transition management (2000-2006) we can recognize an evolutionary pattern (also captured in this thesis) in which three phases can be distinguished: development of the transition concept and transitions-thinking, the development of the transition management approach and model and finally a reflexive phase of evaluation and adaptation. In a sense, the development of transition management followed the process of broadening, deepening and up-scaling as conceptualized for transition-experiments (Van den Bosch and Taanman 2006). Initially, the basic thought emerged that 'transitions' were a valuable concept to analyze societal transformation processes and that these transitions are needed to achieve long-term sustainable development. In this phase the concept of transitions was explored rather analytically: what are transitions and how can we study transitions? Central concepts that emerged were the (adjusted) multi-level and multi-phase concepts. Then the idea developed that transitions could perhaps be managed, based on the understanding of the dynamics of transitions. General starting points for transition management were formulated. Research and practice then focused primarily on the question of what types of process designs and policy instruments for transition management should be developed and implemented. The transition arena emerged in this process as a central instrument, along with the facilitation and organization hereof. In this phase the model was sometimes implemented too rigidly and the transition arena-process was over-structured. In spite of good intentions, step-by-step process designs were developed, and all time and energy was directed to managing and facilitating the transition arena. Perhaps too little attention was paid to the dynamics in the external environment that resulted from the transition arena activities, while this ultimately is the goal of transition management. This brings to the forefront again the issue of creating and maintaining the necessary space for innovation and experiments and the competences for managing such processes.

Obviously, the ultimate goal of transition management should be to influence and empower civil society in such a way that people themselves shape sustainability in their own personal environments, and in doing so contribute to the desired transitions to sustainability. Contrary to many governance processes related to sustainable development, transition management does not start by creating a broad support and consensus, but focuses first and foremost on niche-actors, innovators and pioneers before gradually broadening the process and scope. In this perspective the transition arena model as presented in this thesis is an instrument to involve and connect these niche-actors with pioneers and innovators (also from within the regime). The experiences with various transition management processes led to the third development phase, in which concerns come to the forefront regarding the impact of transition management on regular policy and aspects of social learning and methods and approaches to support these (such as transition monitoring). In this perspective, the transition arena is considered to be a tool for policy innovation and a flywheel for societal innovation. This means that more attention should be diverted to the interaction between a structured transition arena process and how this impacts the regular policy environment in order to be able to optimize the effects. This reflexive side of transition management is not primarily concerned with the process inside the transition arena, but with the process of broadening the transition arena to a societal movement and translating the transition agenda into regular policy. How the ideas and agendas developed within transition arenas and transition networks can be translated into regular policy and ultimately be implemented, requires a whole new range of approaches, methods and instruments yet to be developed.

The number of individuals involved in transition management within research, policy and intermediary organizations has increased rapidly (estimated by the end of 2006 to be over 1000), and so has the number of application domains and levels at which transition management is applied. In 2001, only 3 or 4 researchers were studying transitions full time. In 2006, this number has increased to over 120. Transition research has become institutionalized scientifically in the transition research network KSI,[39] various other research projects and research groups (such as Drift[40]). In government, only around 5 Fte's (Full time equivalents) were involved in transitions in 2001, while in 2006 this had increased to over 100. Within various Ministries, the Interdepartmental IPE, Senternovem (intermediary organization), provinces, regions and municipalities, groups or individuals are involved in implementing transition management. A similar growth can be witnessed amongst NGOs and in business where, though it is hard to find exact figures, it is clear that there is a broad participation in diverse transition processes. Examples of organizations active in developing and implementing their own approach towards transition management, are provincial environmental organizations of Flevoland,[41] Zuid-Holland, Zeeland and Gelderland, and the Foundation for Nature and the Environment.[42]

39 www.ksinetwork.org
40 www.drift.eur.nl
41 http://www.natuurenmilieuflevoland.nl/
42 www.snm.nl

In terms of the attention paid to transitions, the number of 'hits' on Google when looking for 'transitiemanagement' is illustrative: between December 2001 and July 2004 the number of hits increased steadily from 239 to 902. After that, the number of hits increased exponentially to arrive at 20.700 hits in September 2006. A similar development is observed in the attention for transitions in newspapers, which has grown exponentially from only a handful of references to transitions by the end of the last century to over 60 in 2006 (see Figure 10.1). Obviously these figures hold no scientific value but they are illustrative for the spreading of at least the idea of transition management. This corresponds well with the shift from transition management as an experimental idea to transition management as more or less institutionalized practice between 2000 and 2006. Simultaneously, the international attention for transition management has grown, leading to international research programmes[43] and research groups[44] that take up transition and transition management as one of their central themes. In terms of policy, transition management is influencing governance at the European level, and is experimented with in various countries. Examples hereof are the transition arena on sustainable living and building and the transition arena on sustainable resource management in Belgium. New transition arenas may also start in other areas such as agriculture.

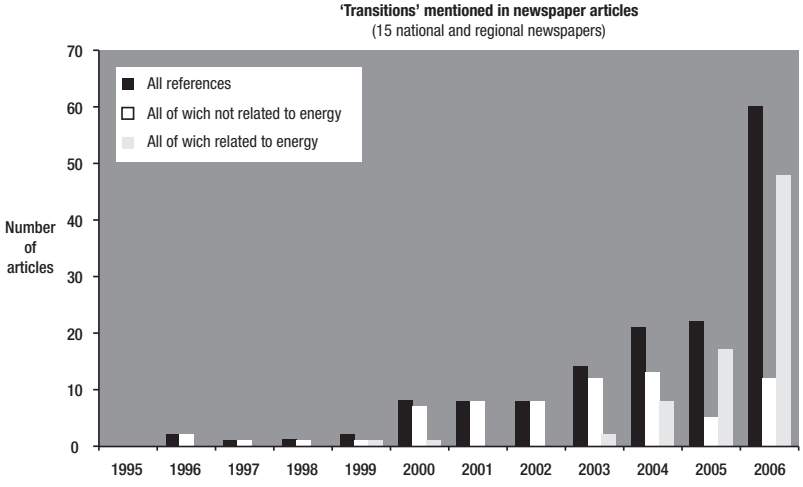


Figure 10.1 Number of references to 'transitions' in Dutch newspapers (Figure provided by Roel van Raak)

Although major progress has been achieved over the last few years regarding theory and practice of transition management, it is clear that the greatest challenges are still ahead. This thesis proposed a specific approach and model for

43 http://www.matisse-project.net/projectcomm/
44 http://www.sussex.ac.uk/sussexenergygroup/

transition management that, although successfully implemented and tested in a selective amount of cases, will never be really finished. As the operationalisation of transition management will depend on its application context, and learning experiences from practice will further inform theory, there can never be a blueprint model or methodology for transition management. It is undoubtedly so that transition and transition management research will explore new theoretical pathways and further develop and refine the new concepts, tools and instruments proposed. Research projects are already underway that further develop transition management concepts such as transition arenas, transition scenarios, transition experiments and transition monitoring. These projects aim not only to further develop and test these transition management instruments but also to further ground these in existing literature. As elements of transition management are further developed, also new research themes related to transition management emerge: power and leadership, democracy and legitimacy.

The transition management approach increasingly draws the attention of a number of scientific disciplines such as policy sciences, business science and innovation studies. So far, transition management has not only stood the test of scientific criticism, it has also improved through scientific debate with a variety of scientists and disciplines. The transition management approach has proved to be an inspiring perspective for research, not only in an explicit way as illustrated in this thesis, but also more implicitly through domain specific research (Hisschemöller et al. 2001; Spaargaren et al. 2002; Grin et al. 2004; Hajer and Poorter 2005; De Vries and Te Riele 2006; Meijer et al. 2006; Verbong and Geels 2006), research on policy instruments (Spakman et al. 2002; Ros et al. 2003; Smits and Kuhlmann 2004; Ten Pierick et al. 2006) or policy research in general (Glasbergen 2002; Van Twist et al. 2004; Voss et al. 2006). The articles mentioned here only represent a section of the variety of transition-related publications, but indicate a growing interest. This thesis tried to ground transition management in a number of disciplines, but obviously much innovation and debate is to be expected in the coming years on the interface between transition management research and all related disciplines.

Simultaneously, the ongoing process of implementing transition management will continue in areas such as energy, agriculture and mobility. Transition management will be applied in new sectors such as health-care, housing, water management, education and regional and spatial planning. These areas provide a fertile breeding ground and experimentation room to further test, develop, implement and adapt transition management. Besides the further development and refinement of transition management as presented in this thesis, the focus will also shift towards new and related issues. Based on recent insights from theoretical reflection and practical experience, the new central areas of interest for transition management practice will be: the (policy) instruments needed to support transition management, the use of transition arenas as instruments for policy innovation, the management of the interface between the transition arena and regular policy, the selection of stakeholders and individual capabilities and roles in transition management. These issues all relate to the transfer of ideas and actions from transition management to regular policy, to the selection of actors, instruments and processes (who selects and what to select?) and the development of a societal movement out of coalitions, networks and projects around transition arenas. The relevancy of these issues is illustrated by

recent transition management projects (for example, the project on sustainable housing and building in Flanders[45]) and processes (such as the energy transition, see Chapter 9).

10.3 The future of transition management

It is evident that transition management needs to develop beyond the experimental phase and evolve into a solid mode of governance that delivers tangible results on the short and the long term. The success of transition management is not so much based on a successful transition arena-process, but based on what happens with the products and processes initiated within the transition arenas in every-day life. The diverse practice of transition management nowadays does not necessarily contribute to the maturing of transition management, but could be a fertile breeding ground for learning and improvement. A danger lies in a haphazard and thin application of transition management so that it is hardly an improvement compared to regular (innovation oriented) policies. The 'label' transition management is increasingly used for projects and processes that are not fundamentally different from regular projects and processes, often stimulated by funding agencies that ask for 'transition' projects (without using strict or scientific criteria). In reality, these are often more optimization or innovation projects or trajectories than transition processes. The 'freedom of application', i.e. the possibility to interpret and use the transition management approach freely is inherent in the approach, which certainly in the beginning lacked preciseness. Even our own approach and model are still ambiguous in some sense and our thinking is continuously in development. It is, however, necessary to be reflective and analytically strict in evaluating and learning from the diversity of practices. Transition management as presented here is not just a 'trick' anyone could do; it could even be dangerous in the hands of managers and consultants when applied in a simple way.

This diversity can provide rich insights into what is effective and what is not. Since there is no ultimate form of transition management in practice and its implementation will differ depending on the context, there is much to be learned. This will require an integrating level at which the lessons learned regarding transition management in general can be discussed, evaluated and integrated into new approaches and projects. This reflection already takes place at the scientific level (in for example the KSI network) and at the government level (within the IPE), but could be coordinated better through a strategic transition-forum in which government, science and business are represented. The Innovation platform, a national high-level think-tank on innovation instituted by Dutch Prime Minister Balkenende, could have been such a forum, but this platform focused predominantly on regular innovation themes (product and process innovation rather than system innovation) and a market-innovation approach. A national transition forum should not only reflect on transitions that are needed, but also on what kind of transition management is needed in light of the ambitions for sustainable development. This approach was suggested to the Innovation plat-

45 Intermezzo II.

form, even asked for by five political parties in parliament (Van Velzen et al. 2003), but not taken up then.

This thesis emphasizes the need for an analytical and systemic approach to managing transitions. Without claiming that the model presented in Chapter 6 is the only operational form of transition management (in fact, we state that this is one possible way of operationalizing transition management), we do know that too loose an application of transition management can be counter-productive: participants become demoralized, innovative individuals abandon the process, results are mediocre and only little action results from the process. Although success is never guaranteed with transition management, it can only be successful with a sharp and well founded selection, facilitation and coordination, analysis and a structured process. This should not to be understood as a plea for a scientific *transition-inquisition*, but rather as a call for a limited yet professional and well founded application of transition management. This would clearly require an inventory of 'best practices', some sort of quality control and a community of transition professionals. These professionals need to be educated in the transition (management) approach, in theory and in practice, they should be able to build innovation networks, utilize expertise and knowledge present in society, be able to create room for innovation processes and to connect innovations and innovators across barriers and networks.

This community of professionals, which has already emerged over the past five years, needs to be able to draw from a shared knowledge-base in which scientific, applied and practical knowledge is combined. The so-called Competence Centre for Transitions[46] has been established as successor of NIDO in 2005 to enable development, collection and transfer of transition management competences and knowledge. To this end, meetings between transition practitioners and transition researchers are organized; so-called competence-kits are developed in areas such as transition management, transition experiments and transition monitoring. So far, this centre has managed to bring together professionals working on transitions, but establishing a solid knowledge base within such a dynamic field as transition research proves to be difficult. Practical knowledge related to different elements of transition management is abundantly available (such as process management, envisioning, experimenting and innovation, etc.) while scientifically there is much debate upon how these elements fit in transition management theoretically, let alone how they should be operationalized. A possible danger is that the substance of transition management is watered down due to a very dynamic practice, in which many individuals explore transition management in a learning-by-doing mode without fundamental reflection or integrated and underpinned strategy. This process is complicated because only a handful of people have a thorough knowledge concerning implementation of the complete transition management approach. Perhaps there are at present not enough transition managers with the necessary knowledge, capabilities and skills to facilitate all transition processes. It is therefore also necessary to engage in critical debate between practitioners and researchers about what is considered to be transition management and what is not.

46 www.senternovem.nl/Competentiecentrum_transities/

What is needed in the next few years is to follow the course taken so far firmly. Although we cannot as yet (and perhaps only will in decades) prove that transition management works, a lot of indicators seem to suggest that it certainly does. Hundreds of professionals have engaged in and committed themselves to transition management, transition agendas formally and informally influence regular policies, new research lines and programmes have started and dozens of transition experiments and programmes are under way. Similar to the debate around climate change during the 1980s and 1990s, there is not (yet) a decisive indicator or argument that indisputably shows that the approach is valid, and sceptics will always be able to identify problem areas, incomplete arguments or doubt the effectiveness. Obviously, we emphasize here that the progress made, the support gained and the new, innovative practices and ideas that originated along the way are all indicators for success and reasons to pursue the idea of managing transitions for sustainable development.

10.4 Future research

The emphasis in this thesis has ultimately come to lie on the operational model and on the way in which processes of change through transition arenas could actually be managed. This might suggest that we feel that transitions can indeed be managed in a classical sense, but obviously this is not the case. As explained in Chapters 3 and 4, we also consider transition management to be a new (conceptual) approach to governance. The transition management approach tries to fill a void in policy and governance sciences with regard to influencing long-term societal change in the direction of sustainable development. It offers a framework for (re-)structuring and focusing existing and well-known governance approaches and models in the context of the persistent problems. This thesis described part of the theoretical basis for transition management in governance, sociological and complex systems theories and approaches. Because of its interdisciplinary (and transdisciplinary) nature, however, the approach can and should be developed and underpinned further. This is true for the theoretical basis described in this thesis, but certainly also for other related scientific disciplines and related themes.

Interesting theoretical issues related to transition management touch upon central debates in policy sciences, management and organizational sciences, business and innovation studies, psychology, spatial planning and urban development or even philosophy. For example, issues relating to the democratic model underlying transition management and the institutional legitimization of transition management, and issues relating to the effectiveness and stability of transition management systems, are all very relevant to societal and governance scientists. Issues relating to individual capabilities, skills, power and behaviour are certainly of interest for psychologists and behavioural scientists. Issues relating to the effectiveness, ineffectiveness and legitimacy of existing policy instruments and those propagated by transition management, are interesting for policy sciences. Finally, the holistic approach and way of thinking about societal change at the level of societal systems and how this relates to individual change, poses a sociological and philosophical challenge of redefining societal change processes, the role of individuals in these and in general the fundamental ques-

tions of how we should organize our societies and deal with our natural environment and other people.

The cross-fertilization between transition management and transition science as an emerging research field on the one hand, and a variety of disciplinary and interdisciplinary fields of research on the other hand is two-directional. Transition management could and should be enriched with relevant scientific insights for further development and implementation, and by doing so make progress in actual transitions in practice. Moreover, transition management could offer inspiration for and critical reflection upon more disciplinary sciences. We have already witnessed the incorporation of transition management ideas in a number of disciplines such as innovation studies, policy sciences, environmental sciences and history. A real fundamental debate within and between these disciplines and transition management researchers, however, has so far remained absent, perhaps with the exception of policy sciences. For the future, however, grounding transition management as a governance approach in existing scientific disciplines and communities will be an important challenge for transition management researchers. Only through engaging in scientific debate will transition management develop enough scientific credibility to ensure continuation of actual implementation. This debate should increasingly be searched for in international circles, since not only the issues addressed by transition management are international, but also the research fields transition management touches upon.

Without drafting the international research agenda for transition management, we can formulate some key issues that will be at the heart of transition management research and practice. These issues are not random, but based on the latest scientific debates and reflection upon transition management practices. The issues mentioned here are therefore all at the intersection of theory and practice, and the underlying question is always how to deal with this issue theoretically as well as in terms of prescriptive process models, instruments or skills.

Selection of stakeholders based on individual capabilities and skills

With regard to the transition arena and transition network itself as well as with regard to the transition team and all actors involved in facilitating the transition arena (for example, in communication, lobbying marketing etc.), selection based on capabilities and roles will become an important area of research. Since selection per se can be regarded as elitist, undemocratic or discriminating in the context of developing policies for societal problems, it is especially important to develop transparent and scientific selection methods and procedures. It will also be important to underpin the necessity for selection further and communicate this cleverly.

Any form of actor-selection is based on the assumption that there are differences between individuals and that specific qualities of individuals are needed to fulfil specific functions. The necessary capabilities, skills and roles of individuals identified as relevant in the context of transition arenas, have so far been mainly based on theoretical hypotheses and practical experience (Chapter 6). A next step will be to derive the necessary capabilities and skills from theory (e.g. transition management, political science, management and business science, psychology) and identify more precisely what types of individuals and organizations will be able to induce or promote structural change at the differ-

ent levels. As suggested in Chapter 5, individuals effective on the strategic level have different capabilities from actors at the tactical and operational level. Obviously, the capabilities, skills and roles themselves also need to be refined and grounded scientifically to a greater extent. By involving scientific disciplines like psychology (individual and group dynamics) and management science, scientifically underpinned profiles of actors can be developed that can be the basis for assessment and selection.

A related area of interest, especially at the strategic and tactical level, is group dynamics, and how these relate to individual capabilities, skills and roles. The selection of individuals also needs to take into account group composition and the functioning of the group as a new actor itself. Different and complementary roles are needed, as well as different sources of knowledge to optimize group functioning. This is important because actors with different perspectives and individual interests are brought together, which complicates the development of shared perspectives and interests. Only with optimal group dynamics can enough trust in the process be built up so that a real impact on regular policies is possible. So the transition arena should not only be a collection of individuals but also a coherent group (network) and be able to act as such to the outside world. It is obvious that inside the transition arena disagreement can exist between strong individuals; in fact we nowadays think that the conflicts inherent in the transition should in some form be reflected within the transition arena. A proper balance between niche- and regime-actors is therefore also of crucial importance.

Management of the transition arena

The research and practice of transition management and its instruments have so far been primarily focused inward. The driving questions were how to organize a transition arena, what systemic instruments need to be used and when and how to decide which process steps need to be taken? A theoretical and operational approach was developed and tested in different contexts and at different levels. Examples were described in Chapters 8 and 9, but over the last five years more than 10 transition arenas in various forms have been established and managed. Experiences herewith show that the basic approach is functional and applicable, although managing a transition arena will always involve a tailoring of the methodology to the specific context. The methodology presented in Chapter 6 may serve as a valuable basis for managing transition arenas, but will undoubtedly be challenged by practice in the future and will evolve further in combination with new theoretical insights. This will be an area in which the focus is more on practice than on theory, although new models and instruments that might emerge need to be grounded theoretically and embedded into the transition management framework.

There are at least two main issues here for further research. The first is the state and type of transition related to the type of transition management approach. Dependent on a.o. the (transition) context, the available time- and financial budget and the initiating organization, the transition arena approach needs to be made context specific. For example, one could start with a strategic transition arena on a small scale to explore alternative visions in an area where innovation and innovative visions are scarce. Or, transition management could start to build on existing innovative projects and experiments to *transitionize* these and by broadening and scaling-up, stimulate the process of agenda-build-

ing and (re-)defining visions. The context thus defines the process architecture, the selection of instruments and actors, the types of analysis and the process management. The basic elements for each type of operational transition management process are presented in this thesis (the framework as well as the transition arena methodology), but it is clear that these are only the basis for experimentation. Transition arenas and their organization and facilitation will always be a learning-by-doing and doing-by-learning process, but the general direction of development seems to materialize. We develop towards a more diverse approach in which different models for transition management (besides the transition arena model as presented here) are iteratively developed for different types of transitions. This can be done by linking different transitional patterns and pathways to specific types and levels of governance.

The different instruments or basic elements of the transition arena model will also need to be developed and tested further. In the existing transition arena projects, often random and very different methodologies have been used for developing transition visions, transition scenarios, transition paths and transition experiments. Besides the fact that these instruments have so far been only loosely defined, their associated methods have been scientifically underdeveloped. Within various transition arenas and a large number of so-called practice programmes for system innovation and transition, the systemic instruments for transition management will be further developed, redefined, tested, evaluated and scientifically grounded.

Transition arenas as instruments for policy innovation

A hitherto barely explored topic of research is the effect of transition arenas (and agendas and experiments) on the regular policy context. The systemic instruments for transition management (see Tables 5.2 and 5.4) not only help to structure a certain internal process (of envisioning, agenda-building and experimenting), they have also shown a notable effect on the external (regular policy) environment. As the transition arena and its ideas mature, the effects on regular policy and the possibilities for inducing change in the regular policy context and its associated institutions gradually increase. Obviously, the ultimate goal of transition management is not only to produce certain concrete outcomes (a vision, a scenario or a report) but to initiate and stimulate processes in which alternatives are constantly developed, implemented and adapted. The interaction of the transition arena with its environment can *transitionize* regular policies and institutions at all levels. This depends both on the quality of the process and products of the transition arena, and on the quality of the management and organization of the interface between the transition arena and the regular policy context. A good example is the energy transition process in which a large amount of ideas, agendas and experiments have been developed that have found their way to regular policies. However, the regular political and societal energy-debate is still largely dominated by short-term concerns, it is still very technology oriented and concerned with liberalization. In the coming years, more attention should be directed toward influencing this debate with the use of the output of the energy transition process.

Interface management of the interaction between the transition arena and the regular policy context involves at least three, partially related, elements. The first is the creation and maintenance of the support for the transition arena from

regular policy. The transition arena is legitimized by regular policy and in the communications towards regular policy the importance of the transition arena and the benefits it yields for regular policy need to be made constantly clear in order to ensure enough room, financial support and societal attention for the issue. The second element concerns the facilitation and organization of individuals involved in the transition arena and the interaction with their daily professional environments. Individuals need to be assisted and stimulated to translate the ideas developed in the transition arena to their own specific context and create new activities there. The third element concerns the communication of the transition arena process and products to a larger public. To create awareness, to stimulate involvement, to diffuse ideas and innovations and to build up societal pressure on regular policies, it is of crucial importance to complement the transition arena process with a communication and mobilization process.

With more attention towards these issues, the transition arena itself can become an important instrument for policy innovation and possibly a niche for a policy transition towards transition governance systems. A specific area of interest is (regular) policy instruments and how they can be used (in an adapted way) in transition management; experiences with the energy transition illustrate that alternative instruments are required, as are institutions, regulation and policy measures. The natural place for reflection upon this and the lever between the transition arena and regular policy context is the transition team, in which experts in the specific field, transition experts and policy experts interact. To be able to reflect upon the transition arena and its possible effects on regular policy, requires strategic capabilities and also innovating power. This implies that the individuals that are part of the transition team should also be innovative individuals with an entrepreneurial character.

The transition arena can become a driving force for societal innovation when around it new coalitions, networks and practices develop in co-evolution with new policies, institutions and regulation. This process itself will become increasingly important beside the horizontal diffusion resulting from a successful transition arena process. Although this will lead to horizontal diffusion on strategic and tactical levels, this process remains confined to involved actors and organizations and does not yet diffuse towards societal networks and citizens. The transition arena itself in this perspective needs to remain intact as an identifiable group of ambassadors that can provide an integrative function in an emerging process and network. The management of this specific aspect, for example when and how to start up new coalitions and new arenas or when and how to step outside transition arenas, is still barely touched upon. The critical issue here is to develop a relatively small critical mass first before creating broad support. This means resisting the pressures to formalize the process, search broad support too quickly and relapse into regular approaches and processes. So far, we have insufficiently thought through and described this process of horizontal diffusion (creating 'arenas of arenas'), which is a crucial element of successful transition management.

The role of power and institutions

To create and maintain the necessary space for innovation, more insight and new strategies are needed on the interplay between innovation processes and the regime. Transition management focuses on innovators and developing alternative

futures that in time may be threatening to the regime. An often-heard comment on the transition management approach is that it is rather naive in its belief in the power of good ideas, in the strength of small networks of innovators and in knowledge-driven policy development. It is often questioned whether regime actors, vested interests and dominant powers will allow structural innovation based only on the promise of sustainability. It is also questioned whether the regime can be forced by a transition network to accept transition agendas and visions unless it is in a major crisis. The literature is ambiguous towards this subject, some argue that periods of crisis are necessary to break a lock-in and offer chances for reform to 'transitional leaders'. Yet others put forward that periods of crises and management in times of crises need to deal with huge uncertainties and possible surprises and drawbacks, which could lead to counterproductive effects (Boin and ´t Hart 2003). Although we do not need to question the transition management approach as such, it is true that because of the tensions between leadership and innovation, so far little attention has been directed towards issues of power, institutions and leadership.

In political and policy sciences, management and innovation literature, there is much to learn about the dynamics of power and leadership and what roles they play in promoting or opposing structural change. Political and societal theories on this subject (for example the critical theory of repressive tolerance by Marcuse, but also on structural power of discourse by Foucault and on power of agents by authors such as Arendt, Giddens and Habermas) could not only help us to understand the dynamics that occur in the interaction between transition arenas and regular policy, but could also provide the basis for developing strategies to influence these dynamics. Innovation studies and leadership and management literature could shed light on the role of leaders, leadership and power with regard to dealing with crises, transformation and change (see for example: Flyvbjerg 1998; Jaskyte 2004; Yammarino et al. 2005). In the end, transitions are structural regime transformations, in which regime actors will ultimately need to change along with the process or fall out of the system. As transitions are ultimately shifts in power, transition management supports niche-actors on their innovation journeys by providing the necessary instruments, strategies and networks. Empowering niche-players is therefore a crucial part of transition management.

Since the regime is often the enabling environment that (indirectly) legitimates and facilitates transition management, there also need to be strategies that deal intelligently with this delicate relationship. A specific element in this area of research is the role of leadership, both within the regime and within the transition arena. Individuals and specific actions can create room and support for transition management in terms of societal involvement, support and in terms of political interest and legitimization. It takes leadership to break through barriers, but also to convey messages that are displeasing. By identifying new types of leadership (formal and informal, structural and innovative) it is possible to reflect upon new transition management strategies that are more targeted to developing and utilizing existing leadership capabilities and to dealing with existing powers. Especially leadership for change in the regular policy context is an uncharted area of research in the context of transition management, while perhaps this issue is of even more importance for final success than leadership of individuals involved in the transition arena. In the end, transition management

is most effective when it is at least accepted by an existing regime as a welcome alternative strategy to circumvent dominant short-term concerns and dynamics. This is the paradox of existing powers that are unable to single-handedly manage desired change, but can only do so by giving up control and allowing alternatives to be developed. In other words regime-actors need to allow for transition management, which at least in the longer-term could be potentially threatening for their position.

The international dimension of transition management

Transition management focuses on persistent societal problems, which occur in all modern societies. In different countries persistent problems related to energy, mobility, agriculture, health-care, spatial planning etc. occur, perhaps not always in the same form, but with similar characteristics. Transitions are thus international phenomena: they are to a large extent determined by international developments, autonomous trends and surprises. Transitions are also needed in many societies that strive for a sustainable development. The basic question is whether the transition management approach presented in this thesis can be used in the international context. A theoretical exercise might suggest that it should be possible (Wijers 2004), but this question will clearly need to be explored further in theory and practice.

An often heard comment on the transition management approach is that it seems typically Dutch. It is not surprising that the approach emerged in the Netherlands, a country with a long tradition of participatory and consensual approaches to policy-making, of long-term planning and of science-policy cooperation. However, a number of characteristics of transition management conflict with Dutch (political) culture too: transition management develops small but strong support rather than broad support, short-term action is based on dissent rather than consensus, the emphasis is on high-risk and uncertainties rather than on no-regret and certainties and the focus is on a strong normative and directing role for the government rather than only a facilitating government. A provocative statement here might be that by definition transition management needs to oppose the dominant (political) culture because of its focus on structural change, including dominant structures, routines and institutions. So although transition management certainly has some characteristics typical for the Netherlands, transition management as complexity governance approach is a generic approach that could at least theoretically be applied within any modern society to address persistent problems. In a number of countries, such as the UK, Germany, Austria, Belgium and even Asia, research and policy experiments with the transition management approach and specific transition management instruments have already started (see for example: Van Humbeeck et al. 2004; see for example: Foxon et al. 2005; Smith et al. 2005; Kern 2006; Morioka et al. 2006; Wiek et al. 2006; Konrad et al. 2007)

We do, however, need to make a clear distinction between the transition management approach and the transition management model. The transition arena model (Chapters 6 and 8) is an operationalization of the transition management approach within the Netherlands. The transition arena project in Flanders on the one hand illustrates that a one-to-one transposition of this model to Flanders is problematic, but on the other it illustrates that that specific application of the generic approach is possible when done by a competent transition team. What

the project therefore does illustrate is that the transition management approach, when operationalized, needs to be made context specific. Where for example within Flemish culture there is not a great distance between policy-makers and niche-actors, the transition arena may need to provide closer interaction with regular policy. Another insight from the project was that, because the participants (unlike the Dutch) were not very used to long-term envisioning exercises and unstructured creative sessions, the process needed to be structured much more than in the Netherlands because the people involved required more certainties and control over the process. However, the fact that the project itself was successful in delivering concrete results and spin-off activities, illustrates again the potential of the approach. Nevertheless, it is clear that transition management is no standard trick, but requires knowledge and experience and above all a lot of time, energy and creativity of all actors involved.

We can state that transition management has an enormous (almost unlimited) international potential. It is an approach that offers starting points for governance which can be translated into new modes of governance and related tools and instruments. The transition arena model itself could also be used in a modified form as a guideline for dealing with predevelopment phases in certain transitions. We are already witnessing the first international initiatives. But transition management is also internationalized the other way around. The Dutch transition management processes are increasingly looking outward (especially to the European Union) because the actors involved realize that the crucial decisions are ultimately taken at higher levels of scale. In this international perspective, Dutch examples such as the energy transition (Chapter 9) can be seen as policy-experiments that are already drawing a lot of attention. Alongside an expanding international research network on transitions, it seems clear that transition management internationalizes also in terms of policy.

10.5 Concluding remarks: does transition management work?

Finally the ultimate question returns: does transition management work? This thesis gives no unequivocal answer to the question whether it is possible to actually manage transitions to sustainable development, but in fact this is impossible at this point as we have argued before. The potential and the positive effects of the transition management approach and model, however, are obvious. These are reflected in the rapidly expanding practice of transition policies, research and projects. This thesis has contributed to both the fields of transition practice and theory. It shows that transition management leads to innovative ideas, analyses, processes, policies and most importantly, to changes in the mindset of innovators and pioneers in processes of change. In 2001, we even underestimated the positive contribution of transition management to creating dynamics, movement, élan, new practices, new worldviews and in general change at all levels. We have shown that transition management can have an actual impact on regular policies and institutions and under specific conditions can *transitionize* a regular policy context. We have also made clear that transition management is still in an early phase of development. Although we have grounded and underpinned transition management theoretically in this thesis and shown the actual impact of the transition arena model, we seem to be only at the beginning of discovering

transition management. The assumption that the potential of transition management is still to be discovered and explored is strengthened by the fact that scientifically as well as in policy practice no failures or fundamental objections have been encountered.

Theoretically, transition management fills a void: so far there have been no fully-fledged theoretical and operational approaches that address persistent societal problems and the way to deal with these in the long-term**.** Transition management does so descriptively as well as prescriptively. It provides an approach for analyzing governance in the context of transitions and for understanding existing policies and governance and their influence on long-term change. The new conceptualization of governance as an activity carried out by all actors in society, fitting the network-society paradigm, is the basis for developing new governance strategies and instruments for dealing with this network society and reflecting upon new roles of the various actors. For policy sciences and sociology this could lead to innovative research and theory.

In practice, the transition arena approach has proved to be effective in building up a network with a shared vision and agenda that can impact regular policy. As a new governance instrument it has certainly been successful in creating room for innovation in general and in becoming an area where new ideas develop, mature and diffuse. The establishment of a growing number of transition arenas can be seen as an indicator for this success. But as we have also shown in this thesis, the success of the transition arena ultimately depends on the quality of its guidance and facilitation, its members and the circumstances under which the transition arena operates. It is therefore never a definitive recipe for success, but at least it offers the prospects and possibilities for breaking through existing lock-in and develop bottom-up alternative sustainable trajectories.

In general, transition management has inspired many individuals to explore and develop alternative practices in their own regular context. These individuals, on many levels and with diverse backgrounds, recognize the added value of transition thinking and the transition management approach and try to use it for their own benefit or that of their organization. A large number of transition management practices is emerging and a community of practice seems to grow rapidly. This diffusion of transition management is also illustrated by the expansion of domains in which transition management is implemented. Besides the NMP4-transitions, other domains have started transition management processes too: examples are water management, the building sector, the chemical industry, spatial planning and health-care. The strength of the transition management becomes visible here: it offers generic starting points and a coherent way of thinking combined with a framework for action and it offers at the same time enough flexibility and freedom in application to allow for diverse, context-specific operational forms of transition management.

We can expect transition management to grow further into maturity and develop into a real influence on regular policy. This will certainly lead to all sorts of interesting dynamics and new insights about managing transitions, for example related to the way in which regular policies will try to integrate transition management in their practices rather than allowing transition management to become a too powerful influence. Transition management therefore must be able to deal with the regime context and the mechanisms the regime uses to deal with possibly emerging revolutionary changes. The 'defence mechanisms' of

the regime can only be circumvented through clever and innovative strategies. In this context transition management has one great advantage that could be the key to success in terms of transforming regimes also from within: powerful and pioneering individuals incorporate the transition management approach and through that promote transitions in their own daily environment. The mere fact that over the past few years hundreds of individuals have become enthusiastic about transition management and have initiated all sorts of processes within their organizations, shows that it is possible to introduce new practices into existing organizations and structures.

The theoretical progress made over these last few years, along with the results achieved in practice so far, is promising. Practice, however, has proved to be more complex and persistent than, perhaps naively, expected. It will therefore require even more energy, time, courage, creativity, co-production and understanding to develop transition management beyond this point. We have yet to complete a full transition management cycle, and in this sense big challenges are still ahead. This thesis has tried and in some areas certainly succeeded to advance thinking and acting regarding long-term societal change and sustainable development. It reflects my personal development as well as that of many professionals involved in transition management. This thesis greatly benefited from this growing network of transition professionals and transition practices and hopefully can contribute to it in turn and inspire many others. Transition management has become a collective enterprise, a new trajectory, fuelled by theoretical insights and practical experience. It brings together entrepreneurs, policy officials, scientists and all sorts of individuals in a shared quest for sustainable development, just as it was meant to be.

Literature

Allen, P. M. (2001). Knowledge, ignorance, and the evolution of complex systems. Frontiers of evolutionary economics: competition and self-organization and innovation policy. J. Foster and J. S. Metcalfe. Cheltenham, Edward Elgar.
Allen, P. M. and M. Strathern (2003). "Evolution, Emergence, and Learning in Complex Systems." *Emergence* **5**(4): 8-33.
AOO (2002). Het poldermodel op de afvalhoop?: De rol van overleg in het toekomstige afvalbeleid? Utrecht, Afval Overleg Orgaan.
Argyris, C. and D. Schon (1978). *Organizational Learning: A theory of action perspective*. Reading MA, Addison-Wesley.
Arthur, W. B. (1999). "Complexity and the Economy." *Science* **284**(5411): 107-109.
Arthur, W. B., S. N. Durlauf and D. A. Lane (1997). *The economy as an evolving complex system*. Reading, MA, Addison-Weasly.
Bak, P. (1996). *How Nature Works: The Science of Self-Organized Criticality*, Copernicus Books.
Baumgartner, F. and B. Jones (1993). *Agenda and Instability in American Politics*. Chicago, The University of Chicago Press.
Beck, U. (1992). *Risk Society; towards a new modernity*. London, Sage Publications.
Beck, U. (1994). The reinvention of politics: towards a theory of reflexive modernization. *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order*. U. Beck, A. Giddens and S. Lash. Cambridge, Polity Press.
Beck, U. (1999). *World Risk Society*. Cambridge, Polity Press.
Berkhout, F., A. Smith and A. Stirling (2004). Socio-technical regimes and transition contexts. *System Innovation and the Transition to Sustainability.* B. Elzen, F. W. Geels and K. Green. Cheltenham, Edward Elgar.
Berkhout, G. (2002). Van poldermodel naar innovatiebeleid. *Het Nederlandse innovatiebeleid: tijd voor vernieuwing*. Den Haag, Ministerie van EZ.
Bijker, W., T. Hughes and T. Pinch, Eds. (1987). *The Social Construction of Technological Systems*. Cambridge, MIT Press.
Boin, A. and P. ´t Hart (2003). "Public Leadership in Times of Crisis: Mission Impossible?" *Public Administration Review* **63**(5): 544-552.
Bood, R. and M. Coenders (2003). *Communities of Practice*. The Hague, Lemma.
Bosch, A. and W. Van der Ham (1998). *Twee eeuwen Rijkswaterstaat, 1798-1990*. (*Two centuries Rijkswaterstaat, 1798-1990*). Zaltbommel, European Library.
Bosma, A., G. Brouwer, H. Diepenmaat, C. Jordan, J. P. Van Soest, G. Van Toledo and A. Van der Weiden (2003). To C or not to C, that's the question. Vaison-la-Romaine/ Rotterdam, ROM-Rijnmond.
Boulding, K. E. (1970). *A primer on social dynamics: history as dialectics and development*. New York, Free Press.
Bourdieu, P. (1977). *Outline of a Theory of Practice*. Cambridge, Cambridge University Press.
Bruggink, J. (2006). *Op weg naar de duurzame energievoorziening*. Amsterdam, Free University.
Callon, M. (1999). Actor-network Theory: The Market Test. *Actor Network Theory and After*. J. Law and J. Hassard. Oxford, UK, Blackwell.
Castells, M. (1996). *The rise of the network society*. Massachusetts, Blackwell Publishers.
Cavallo, A. (2004). "Predicting the Peak in World Oil Production." *Natural Resources Research* **11**(3): 187-195.
CBS (2005). Duurzame energie: capaciteit, productie en vermeden primaire energie. Voorburg/Heerlen, Centraal Bureau voor Statistiek.
Checkland, P. and J. Scholes (1990). *Soft Systems Methodology in Action*. Toronto, John Wiley and Sons.

Clark, W. C. (2002). *Social Learning. Encyclopedia of Global Change*. Oxford, Oxford University Press.
Clark, W. C. (2003). Sustainability, energy use and public participation. *Public Participation in Sustainability Science*. B. Kasemir, J. Jager, C. Jaeger and M. Gardner. Cambridge, Cambridge University Press.
Clark, W. C., P. J. Crutzen and H. J. Schellnhuber (2005). Science for Global Sustainability: Toward a new paradigm. Cambridge, MA, USA, Harvard University.
Coleman, J. (1994). *Foundations of Social Theory*. Harvard, Harvard University Press.
Coleman, J. S. (1958). "Relational analysis: The study of social organizations with survey methods." *Human organization*(17): 28-36.
Collingridge, D. (1980). *The Social Control of Technology*. London, Frances Pinter.
CTOA (1996). Eindrapport. Den Haag, Commissie Toekomstige Organisatie Afvalverwijdering.
Daemen, J. (2003). *Waste Management Planning in the Netherlands*. waste management council meeting on 5-6 November, A00 Utrecht.
Davis, R. (1945). "The World Demographic Transition." *The Annals of the American Academy of Political and Social Science* **235**: 1-11.
De Bruijn, J. A., E. F. Ten Heuvelhof and R. In 't Veld (1998). *Procesmanagement: over procesontwerp en besluitvorming*. Den Haag, Academic Service.
De Bruijn, J. A., Ten Heuvelhof, E.F. (1997). *Sturingsinstrument voor de overheid; Over complexe netwerken en een tweede generatie sturingsinstrumenten*. Houten, Stenfert Kroese (Educatieve Partners Nederland).
De Graaf, R. and F. Van de Ven (2006). *The Closed City as a strategy to reduce vulnerability of urban areas for climate change*. Innovations in coping with water and climate risks, Amsterdam, IWA.
De Haan, J. (2006). "How Emergence Arises." *Submitted to: Ecological Complexity (Special Issue on Complexity and Ecological Economics)*.
De Vries, J. and H. Te Riele (2006). "Playing with Hyenas: Renovating Environmental Product Policy Strategy." *Journal of Industrial Ecology* **10**(3): 111-127.
DeLeon, P. (1999). The Stages Approach to the Policy Process: What has it done? Where is it going? *Theories of the Policy Process*. P. A. Sabatier. Boulder, Westview.
Deraedt, B., D. Loorbach, J. Van Assche and M. Van de Lindt (2005). Situatieschets Wonen en Bouwen in Vlaanderen. Brussel, AMINAL.
Diepenmaat, H. (1997). *Trinity; Model-based Support for Multi-actor Problem Solving applied to Environmental Problems*. Amsterdam, University of Amsterdam.
Dierkes, M., U. Hoffmann and L. Marz (1992). *Leitbild und Technik. Zur Entstehung und Steuerung technischer Innovationen*. Berlin, Edition Sigma.
Dietz, T., E. Ostrom and P. C. Stern (2003). „The struggle to govern to commons." *Science* **302**: 1907-1911.
Dirven, J. and L. Kusiak (1999). A concern and a dream: a plea for agendabuilding in policy making. The Hague, Ministry of Agriculture, nature Management and Fisheries.
Dirven, J., Rotmans, J. en Verkaik, A. (2002). Samenleving in transitie: Een vernieuwend gezichtspunt. Den Haag, Innovatienetwerk Agrocluster en Groene Ruimte.
Dohmen, J. (13-05-06). De renaissance nabij (Close to the Renaissance). *NRC Handelsblad*.
Durkheim, E. (1947). *The Division of Labour*. New York, Free Press.
EA (2000). Energie en samenleving in 2050, Nederland in wereldbeelden. Den Haag, Ministry of Economic Affairs.
EA (2001). De Reis. Transitie naar een duurzame energiehuishouding. Den Haag, Ministry of Economic Affairs.
EA (2001). Investeren in Energie: keuzes voor de toekomst. The Hague, Ministry of Economic Affairs.
EA (2003). Plan van aanpak. Project Implementatie Energietransitie fase 2. Den Haag, Ministry of Economic Affairs.

EA (2003). Sturen naar het zuiden. Een vernieuwd overheidsoptreden om de energietransitie op weg te helpen. Den Haag, Ministerie van Economische Zaken.
EA (2004). Innovatie in het energiebeleid. Energietransitie: stand van zaken en het vervolg. Den Haag, Ministry of Economic Affairs.
EA (2004). Innovation in Energy Policy. The Hague, Ministry of Economic Affairs.
Easterling, W. and K. Kok (2002). "Emergent Properties of Scale in Global Environmental Modeling – Are There Any?" *Integrated Assessment* **3**(2–3): 233–246.
Eberg, J. (1997). *Waste Policy and Learning: Policy Dynamics of Waste Management and Waste Incineration in the Netherlands and Bavaria*. Delft, Eburon.
Eberg, J. (1998). "De nationale stempel op afvalbeleid." *Bestuurskunde* **7**(5): 228-236.
Eberg, J. W., H. P. Potman and V. J. J. M. Bekkers (1998). "De dynamiek van afvalbeleid." *Bestuurskunde* **7**(5): 206-209.
Edelenbos, J. (1999). "Design and Management of Participatory Public Policy Making." *Public Management* **1**(4): 569-578.
Eising, R. and B. Kohler-Koch (1999). Introduction: Network Governance in the European Union. *The Transformation of Governance in the European Union*. B. Kohler-Koch and R. Eising. London, Routledge**:** 3-13.
Eldredge, N. and S. J. Gould, Eds. (1972). *Punctuated Equilibrium: An Alternative to Phyletic Gradualism*. Models in paleobiology. San Francisco, Cooper & Co.
Elias, N. (1978). *The History of Manners. The Civilizing Process*. New York, Pantheon Books.
Energieraad and VROM-raad (2004). Energietransitie: Klimaat voor nieuwe kansen. 's Gravenzande, Energieraad, VROM-raad.
Flemish-Government (2003). Milieubeleidsplan (environmental policy plan). Ministry of the Flemish Government.
Flood, R. (2001). The relationship of "systems thinking" to action research. . *Handbook of Action Research*. P. Reason, and Bradbury, and H. London, Sage**:** 133-145.
Flyvbjerg, B. (1998). *Power and Rationality: Democracy in Practice*. Chicago, The University of Chicago Press.
Flyvbjerg, B. (2001). *Making Social Science Matter. Why social inquiry fails and how it can succeed again*. Cambridge, Cambridge University Press.
Flyvbjerg, B. (2006). "Five Misunderstandings About Case Study Research." *Qualitative Inquiry* **12**(2): 219-245.
Fox, C. and H. Miller (1996). *Postmodern Public Administration: Towards Discourse*. Thousand Oaks, Sage.
Foxon, T., P. Pearson, Z. Makuch and M. Mata (2005). Policy Drivers and Barriers for Sustainable Innovation. London, Imperial College, Centre for Energy Policy and Technology.
Fukuyama, F. (1992). *The End of History and the Last Man*. New York, Free Press.
Funtowicz, S. O. and J. R. Ravetz (1994). "The Worth of a Songbird – Ecological Economics as a Post-Normal Science." *Ecological Economics* **10**(3): 197-207.
Geels, F. (2004). "Sectoral systems of innovation to socio-technical systems; Insights about dynamics and change from sociology and institutional theory." *Research Policy* **33**: 897-920.
Geels, F. W. (2002). Understanding the Dynamics of Technological Transitions: A Co-evolutionary and socio-technical analysis. *Centre for Studies of Science, Technology and Society*. Enschede, Universiteit Twente**:** 426.
Geels, F. W. and R. Kemp (2000). Transities vanuit sociotechnisch perspectief. Maastricht, MERIT.
Geels, F. W., Kemp, R., Ed. (2005). *Transitions, Transformations and Reproduction. Dynamics in Socio-technical Systems*. Flexibility and Stability in the Innovating Economy. Oxford, Oxford University Press.
Geels, F. W. and J. Schot (2005). "Taxonomy of Sociotechnical Transition Pathways." *Submitted to: Research Policy*.

Geldof, G. (2002). 'Omgaan met complexiteit bij integraal waterbeheer'. Twente, Universiteit Twente.
Gell-Man, M., Ed. (1994). *Complex Adaptive Systems*. Complexity: Metaphors, Models and Reality, Addison-Wesley, Reading MA.
Gersick, C. J. G. (1991). "Revolutionary change theories: a multi-level exploration of the punctuated equilibrium paradigm." *The academy of management review* **16**(1): 10-36.
Gibbons, M., C. Limoges, H. Nowotny, S. Schwartzman, P. Scott and M. Trow (1994). *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. London, Sage.
Giddens, A. (1984). *The constitution of society. Outline of the theory of structuration*. Cambridge, Polity Press.
Giddens, A. (1987). *Social Theory and Modern Sociology*. Stanford, Stanford University Press.
Giddens, A. (1993). *Sociology*. Cambridge, Polity Press.
Gladwell, M. (2000). *The Tipping Point*. London, Little, Brown.
Glasbergen, P. (2002). "Transities naar duurzame ontwikkeling. Over de relevantie van het benutten van het marktmechanisme." *Milieu* **3**: 110-122.
Glaser, B. G. and A. Strauss (1967). *Discovery of Grounded Theory. Strategies for Qualitative Research*. New York, Sociology Press.
Gould, S. J. (2002). *The Structure of Evolutionary Theory*. Harvard, Harvard University Press.
Gould, S. J. and N. Eldredge (1977). "Punctuated equilibria: the tempo and mode of evolution reconsidered." *Paleobiology* **3**: 115-151.
Greenwood, D. and M. Levin (1998). *Introduction to action research*. Thousand Oaks, California, Sage.
Grin, J. (2004). De politiek van omwenteling met beleid. Amsterdam, Universiteit van Amsterdam.
Grin, J., F. Felix, B. Bos and S. Spoelstra (2004). "Practices for reflexive design: lessons from a Dutch programme on sustainable agriculture." *International Journal Foresight and Innovation Policy* **1**(1/2): 126-149.
Grin, J. and A. Grunwald (2000). Technology Assessment as a Tool for Political Judgement. *Vision Assessment: Shaping Technology in 21st century society. Towards a repertoire for Technology Assessment*. J. Grin and A. Grunwald. Heidelberg, Springer Verlag.
Grin, J. and H. Van de Graaf (1996). "Implementation as communicative action." *Policy Sciences* **29**(4): 291-319.
Grin, J., H. Van De Graaf and P. Vergragt (2003). "Een derde generatie milieubeleid; een sociologisch perspectief en een beleidswetenschappelijk programma." *Beleidswetenschap* **17**(1): 51-57.
Grin, J. and R. Weterings (2005). *Reflexive monitoring of systems innovative projects: strategic nature and relevant competences*. 6th Open Meeting of the Human Dimensions of Global Environmental Change Research Community, Bonn.
Grosskurth, J. (2007). "Ambition and Reality in Modelling – a case study on public planning for regional sustainability." *Sustainability: Science, Practice, & Policy*.
Grosskurth, J. and J. Rotmans (2005). "The SCENE Model: getting a grip on sustainable development in policy making." *Environment, Development and Sustainability* **7**(1): 135-151.
Grosskurth, J. and J. Rotmans (2007). QSSI: A New Type of Sustainability Indicator. *Sustainability Indicators – A Scientific Assessment*. T. Hak, B. Moldan and A. Dahl. Washington, Island Press. **67**.
Gunderson, L. H. and C. S. Holling (2002). *Understanding transformations in human and natural systems*. Washington, Island Press.
Habermas, J. (2003). *The Future of Human Nature*. Cambridge, Polity Press.

Hajer, M. and M. Poorter (2005). Visievorming in transitieprocessen. Amsterdam, Amsterdam University – ASSR.
Hajer, M. A. (1995). *The Politics of Environmental Discourse – Ecological Modernisation and the Policy Process*. Oxford, Oxford UP.
Hajer, M. A. (2002). "Discourse Analysis and the Study of Policy Making." *European Political Science* **2** (1): 61-65.
Hall, A. D. and R. E. Fagen (1956). "Definition of System." *General Systems* **1**: 18-28.
Hardin, G. (1968). "The Tragedy of the Commons." *Science* **162**(3859): 1243-1248.
Hawken, P., A. H. Lovins and H. Lovins (1999). *Natural Capitalism*. Boston, Little, Brown.
Hisschemöller, M. (1993). De democratie van problemen. Amsterdam, Vrije Universiteit.
Hisschemöller, M., M. Andersson, M. Kerkhof van de and W. Tuinstra (2001). *What do we know yet about the institutions needed for the transition toward a decarbonized economy*. Conference on Institutions and Instruments to Control Global Environmental Change.
Hisschemöller, M. and R. Hoppe (1996). Coping with intractable controversies: the case of problem structuring in policy design and analysis. *Knowledge and Policy: the International Journal of Knowledge Transfer*. M. Hisschemoller, R. Hoppe, W. Dunn and J. R. Ravetz. **8:** 40-60.
Hisschemoller, M., R. Hoppe, W. Dunn and J. Ravetz, Eds. (2001). *Knowledge, power, and participation in environmental policy analysis*. New Brunswick, NJ, Transaction Publishing.
Hofman, P. S. (2005). Innovation and Institutional Change. *CSTM*. Twente, Twente University.
Holland, J. H. (1995). *Hidden Order: How Adaptation Builds Complexity*. Cambridge, Massachusetts, Helix books / Perseus books.
Holling, C. S., Ed. (1978). *Adaptive Environmental Assessment and Management*. New York, John Wiley & Sons.
Hooghe, L., Ed. (1996). *Cohesion Policy and European Integration*. Oxford, Oxford University Press.
Hooghe, L. and G. Marks (2001). *Multi-level governance and European integration*. Oxford, Rowman & Littlefield Publishers.
Hoogwijk, M. (2004). *On the global and regional potential of renewable energy sources*. Utrecht, Utrecht University.
ICIS (2001). Vision development for Parkstad Limburg in transition. Maastricht, ICIS.
ICIS (2001). Visions on Parkstad. Maastricht, ICIS, UM.
ICIS (2003). Transition of GAVE: GAVE according to the transition concept. Utrecht, NOVEM.
ICIS (2004). NIDO Evaluatie. Maastricht, Maastricht University.
ICIS (June 25, 2002). Startdocument (...) envisioning Parkstad Limburg. Maastricht, ICIS.
Jacobsson, S. and A. Johnson (2000). "The diffusion of renewable energy technology: an analytical framework and key issues for research." *Energy Policy* **28**: 625-640.
Jansen, L. (2003). "The challenge of Sustainable Development." *Journal of Cleaner Production* **11**: 231-245.
Jaskyte, K. (2004). "Transformational Leadership, Organisational Culture, and Innovativeness in Nonprofit Organisations." *Nonprofit Management & Leadership* **15**(2): 153-169.
Jensen, H. J. (1998). *Self-Organized Criticality: Emergent Complex Behavior in Physical and Biological Systems*, Cambridge University Press.
Jessop, B. (1997). The Governance of Complexity and the Complexity of Governance: Preliminary remarks on some problems and limits of economic guidance. *Beyond market and Hierarchy. Interactive Governance and Social Complexity*. A. Amin, Hausner, J. . Cheltenham, Edward Elgar.

Jessop, B. (2002). Governance and Metagovernance: On Reflexivity, Requisite Variety, and Requisite Irony. *Published by the Department of Sociology*. Lancaster, Lancaster University.

Kasemir, B., J. Jager, C. Jaeger and M. Gardner, Eds. (2003). *Public Participation in Sustainability Science*. Cambridge, Cambridge University Press.

Kates, R. W., W. C. Clark, R. Corell, J. M. Hall, C. C. Jaeger, I. Lowe, J. J. McCarthy, H. J. Schellnhuber, B. Bolin, N. M. Dickson, S. Faucheux, G. C. Gallopin, A. Grubler, B. Huntley, J. Jager, N. S. Jodha, R. E. Kasperson, A. Mabogunje, P. Matson, H. Mooney, B. Moore, T. O'Riordan and U. Svedin (2001). "Environment and development – Sustainability science." *Science* **292**(5517): 641-642.

Kauffman, S. (1995). *At home in the universe: the search for laws of complexity*. Oxford, Oxford University Press.

Kemp, R. (1994). "Technology and the transition to environmental sustainability. The problem of technological regime shifts." *Futures* **26**(10): 1023-1046.

Kemp, R. and D. Loorbach (2003). *Governance for Sustainability Through Transition Management*. EAEPE Conference, November 7-10, 2003, Merit Maastricht.

Kemp, R. and D. Loorbach (2003). *Governance for sustainability through transition management*. IHDP-conference, Montreal.

Kemp, R. and D. Loorbach (2005). Dutch policies to manage the transition to sustainable energy. *Jahrbuch Okologische Okonomik*. J. Meyerhoff. Marburg, Metropolis Verlag. **4:** 123-151.

Kemp, R. and D. Loorbach (2006). Transition management: a reflexive governance approach. *Reflexive Governance*. J. Voss, R. Kemp and D. Bauknecht, Edward Elgar.

Kemp, R., Loorbach, D., Rotmans, J. (2007). "Transition management as a model for managing processes of co-evolution towards sustainable development." *The International Journal of Sustainable Development and World Ecology* (Special Issue on Co-evolution) **14**: 1-15..

Kemp, R. and J. Rotmans (2005). The Management of Co-evolution of Technical, Environmental and Social Systems. *Towards Environmental Innovation Systems*. M. Weber and J. Hemmelskamp. Heidelberg, Germany, Springer-Verlag**:** 33-57.

Kemp, R., J. Schot and R. Hoogma (1998). "Regime shifts to sustainablilty through processes of niche formation: the approach of strategic niche management." *Technology analysis and strategic management* **10**: 175-196.

Kemp, R. and S. Van den Bosch (2006). *Transitie-experimenten*. Delft/Rotterdam, Kenniscentrum Transities.

Kern, F. (2006). *Transition Management in der holländischen Energiepolitik – Ein Erfolgsmodell für Deutschland?* DVPW-Kongress 2006: Staat und Gesellschaft – fähig zur Reform?, Münster, Deutsche Vereinigung für Politische Wissenschaft.

KETI (2000). Van saneren naar innoveren. De rol van kennis en technologische innovaties bij het realiseren van beleidsopgaven van NMP4. The Hague, Ministry of VROM.

Kickert, W. J. M. (1991). Complexiteit, zelfsturing en dynamiek. Over management van complexe netwerken bij de overheid. Rotterdam, Erasmus Universiteit.

Kickert, W. J. M. (2004). *History of governance in the Netherlands*. The Hague, Elsevier Overheid.

Kickert, W. J. M., E. H. Klijn and J. Koppenjan (1997). *Managing complex networks: strategies for the public sector*. London, Sage.

Kingdon, J. W. (1995). *Agendas, Alternatives and Public Policies*. University of Michigan, Addison-Wesley Educational Publishers Inc.

Klijn, E.-H. and J. F. M. Koppenjan (2000). "Politicians and interactive decision making: institutional spoilsports or playmakers." *Public Administration Review* **78**(2): 365-387.

Kondratieff, N. D. (1935). "The Long Waves in Economic Life." *Review of Economic Statistics* **17**(6).

Konrad, K., J. Voss and B. Truffer (2007). "Transformations in consumption and production patterns from a regime perspective." *Journal of cleaner production*. Special issue on Sustainable consumption and production.
Kooiman, J. (1993). *Modern governance: new government-society interactions*. Londen, Sage.
Kuhn, T. S. (1962). *The Structure of Scientific Revolutions*. Chicago, IL., University of Chicago Press.
Kuks, S. M. M. and H. T. A. Bressers (2000). Multilevel governance patterns and the protection of groundwater and drinking water in Florida and the Netherlands, Center for Clean Technology and Environmental Policy.
Lansink, A. (2004). *The Waste Hierarchy*. Workshop Waste Management, AOO.
Latour, B. (1987). *Science in Action*. Cambridge Massachusetts, Harvard University Press.
Latour, B. (1992) Where are the Missing Masses? Sociology of a Door-Stopper. http://www.ensmp.fr/~latour/articles/article/050.html
Law, J. (1992). "Notes on the theory of the actor-network: ordering, strategy, and heterogeneity." *Systems Practise* **5**(4): 379-393.
Lee, K. (1993). *Compass and Gyroscope. Integrating Science and Politics for the Environment*. Washington D.C., Island Press.
Leeuwis, C. (2003). Van strijdtonelen en luchtkastelen. *Communicatie en Innovatie Studies*. Oratie, Twente.
Leeuwis, C. and R. Pyburn, Eds. (2002). *Wheelbarrows full of frogs: Social learning in rural resource management*. Assen, Van Gorcum.
Limburger (27-08-2004). De totale make-over van Parkstad (the total make-over of Parkstad).
Limburgs-Dagblad (16-11-05). Massale steun voor 'Parkstad+' (massive support for Parkstad+). *Limburgs Dagblad*.
Limburgs-Dagblad (16-12-05). Kracht Parkstad ligt in het vernieuwende (strength of Parkstad lies in the innovative). *Limburgs dagblad*.
Lindblom, C. E. (1959). "The science of muddling trough." *Public Administration Review* **19**: 79-88.
Lindblom, C. E. (1979). "Still muddling, not yet through." *Public Administration Review* **39**: 517-526.
Lindblom, C. E. and E. Woodhouse (1993). *The policy making process*. New Jersey, Prentice Hall.
Loeber, A. (2003). *Inbreken in het gangbare – Transitiemanagement in de praktijk: de NIDO-benadering*. Leeuwarden, NIDO.
Loeber, A. (2004). Practical wisdom in the risk society. Amsterdam, Universiteit van Amsterdam.
Loorbach, D. (2002). *Transition management: governance for sustainability*. International Dimensions of Human Change, Berlin.
Loorbach, D. (2004). *Governance and transitions: a multi-level policy-framework based on complex systems thinking*. Conference on Human Dimensions of Global Environmental Change, Berlin.
Loorbach, D. (2004). *A multi-level framework for transition management*. SEEON Conference, Seeon.
Loorbach, D., S. Parto and R. Kemp (2003). From Waste Disposal to Waste Management: Transitions in Waste Management in the Netherlands. Maastricht, Merit-ICIS.
Loorbach, D. and N. Rijkens-Klomp (2002). Process design Envisioning Parkstad Limburg. Maastricht, ICIS.
Loorbach, D. and J. Rotmans (2006). Managing transitions for sustainable development. *Understanding Industrial Transformation. Views from different disciplines*. X. Olshoorn, Wieczorek, A. J. Dordrecht, Springer.
Loorbach, D., J. Rotmans, N. Rijkens and W. Tempst (2004). Stof tot Nadenken. OVAM. Maastricht, ICIS/OVAM.

Loorbach, D. and M. Van de Lindt (2006). Aanzet visie DuWoBo. Rotterdam-Delft, Drift-TNO.
Loorbach, D., R. Van der Brugge and J. Rotmans (2003). Op naar synthese tussen sturen én monitoren maatschappelijke veranderingsprocessen. *Arena*.
Luhmann, N. (1984). *Soziale Systemen*. Frankfurt, Suhrkampf.
Luhmann, N. (1995). *Social systems, (originally published in German in 1984)*. Stanford, Stanford University Press.
March, J. G. and J. P. Olson (1995). *Democratic governance*. New York, The Free Press.
Marin, B. and R. Mayntz (1991). *Policy Networks*. Franfurt, Campus Verlag.
Martens, P. (2005). Sustainability Science or Fiction. Maastricht, ICIS.
Masters, J. (1995) The History of Action Research. http://www.scu.edu.au/schools/gcm/ar/arr/arow/rmasters.html
Matthews, E., Rotmans, J., Ruffing, K., Waller-Hunter, J., Zhu, J. (1997). Global Change and Sustainable Development: Critical Trends. New York, United Nations, Department for Policy Cordination and Sustainable Development.
Mayntz, R. (1993). Governing failures and the problem of governability: some comments on a theoretical paradigm. *Modern Governance: New Government-Society Interactions*. J. Kooiman. London, Sage.
McCarthy, D. (2003). Complex systems thinking and post-normal planning and governance. Waterloo. http://www3.sympatico.ca/dkmccarthy/index.htm
McElroy, M. (2002). *The New Knowledge Management*. Burlington, MA, Butterworth-Heinemann.
McLaughlin, M. (1987). "Learning from Experience: Lessons from Policy Implementation." *Educational Evaluation and Policy Analysis* **9**(2): 171-178.
Meadowcroft, J. (1997). "Planning for sustainable development: insights from the literatures of political science." *European Journal of Political Research* **31**: 427-454.
Meadowcroft, J. (2005). "Environmental political economy, technological transitions and the state." *New Political Economy* **Volume 10**(4): 479-498.
Meadows, D. (1999). Leverage points: places to intervene in a system. Hartland, Sustainability Institute.
Meijer, I., M. Hekkert, J. Faber and R. Smits (2006). "Perceived uncertainties regarding socio-technological transformations: towards a framework." *International Journal of Foresight and Innovation Policy* **2**(2): 214-240.
Midgley, G., Ed. (2000). *Systemic intervention: philosophy, methodology and practice*. New York, Kluwer Academic Publishers.
Milward, H. and K. Provan (2000). How networks are governed. *Governance and Performance*. C. Heinrich and L. Lynn. Washington DC, Georgetown University Press**:** pp. 238-262.
Mintzberg, H. (2005). Developing theory about the development of theory. *Great minds in management*. K. Smith, Hitt, M. Oxford, Oxford University Press.
Mitleton-Kelly, E. (2003). Ten principles of complexity and enabling infrastructures. *Complex systems and evolutionary perspectives of organizations: the application of complexity theory to organizations*. E. Mitleton-Kelly. London, Elsevier**:** 3-19.
MNP (2005). MilieuCompendium. *0141*. Samenstelling van huishoudelijk restafval. Bilthoven, Milieu en Natuur Planbureau.
Morioka, T., O. Saito and H. Yabar (2006). "The pathway to a sustainable industrial society." *Sustainability Science* **1**: 65-82.
Nicolis, G. (1989). Self-organized criticality: emergent complex behaviour in physical and biological systems. P. Davids. Cambridge. U. K., Cambridge University Press.
NIDO (1999). De sprong naar duurzame ontwikkeling. NIDO. Leeuwarden, NIDO.
Nooteboom, B. (2004). *Innovatie: theorie en beleid*. Tilburg.
Nooteboom, S. (2006). Aadptive Networks; the governance for sustainable development. *Policy Sciences*. Rotterdam, Erasmus University.

North, D. C. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge, Cambridge University Press.
NRLO (1999). Innovating with ambition, opportunities for agribusiness, rural areas and the fishing industry. The Hague, Ministry of Agriculture, Nature conservation and Fisheries.
Ostrom, E. (1993). Self-Governance, the Informal Public Economy, and the Tragedy of the Commons. *Institutions of Democracy and Development*. P. L. Berger. San Francisco, ICS Press.
Ostrom, E. (1999). Institutional Rational Choice. *Theories of the Policy Process*. P. A. Sabatier. Boulder, Westview.
Parkstad-Limburg (2005). Raadsvoorstel WGR+. P. Limburg.
Parto, S., Loorbach, D., Kemp, R. (2003). *Institutional Change During Transitions: The Case of the Dutch Waste Management Sector*. IHDP Meeting, Montréal, Canada.
Parto, S., Loorbach, D., Lansink, A., Kemp, R. (2006). Transitions and institutional change: The case of the Dutch waste subsystem. *Industrial Innovation and Environmental Regulation*. Parto, S. and Herbert Copley, B. New York, United Nations University Press.
Peters, B. G. (1998). "Managing horizontal government: the politics of co-ordination." *Public Administration* **vol. 76**(2): pp. 295-311.
Pezzoli, K. (1997). "Sustainable Development: a transdisciplinary overview of the literature." *Journal of Environmental Planning and Management* **40**(5): 549-574.
Pierre, J. (2000). *Debating Governance. Authority, Steering and Democracy*. Oxford, University Press.
Pierre, J. and G. Peters (2000). *Governance, Politics and the State*. Basingstoke, Macmillan.
Popper, K. (1959). *The Logic of Scientific Discovery*. New York, NY, Basic Books.
Pressman, J. and A. Wildavsky (1973). *Implementation*. Berkeley, University of California Press.
Prigogine, I. (1987). "Exploring Complexity." *European Journal of Operational Research* **30**: 97-103.
Prigogine, I. and I. Stengers (1984). *Order out of chaos: man's new dialogue with nature*. Boulder, C.O. New Science Library.
Quinn, B. (1980). *Strategies for Change: Logical Incrementalism*. Irwin, Homewood Ill.
Rammel, C., F. Hinterberger and U. Bechtold (2004). Governing Sustainable Development. Vienna, GoSD.
Raven, R. (2004). Strategic Niche Management for Biomass. *History, Philosophy and Technology Studies*. Eindhoven, Technical University Eindhoven.
Ravetz, J. (2006). The Post-Normal perspective. *More puzzle solving for policy*. P. Valkering, B. Amelung, R. v. d. Brugge and J. Rotmans. Maastricht, ICIS.
Ravetz, J. R. (1999). "What is Post-Normal Science." *Futures* **31**(7): 647-653.
Reason, P. and H. Bradbury, Eds. (2001). *Handbook of Action Research*. London, Sage.
Rhodes, R. A. W. (1996). "The New Governance: Governing without Government." *Political Studies* **XLIV**: 652-667.
Rijkswaterstaat (1992). Omgaan met de Omgeving (Dealing with the surrounding area). The Hague, The Netherlands, Ministry of Transport, Public Works and water management.
Rip, A. and R. Kemp (1998). Technological Change. *Human Choice and Climate Change*. S. Rayner and E. Malone. Columbus, Ohio, Battelle Press. **Volume 2:** 327-399.
Rittel, H. and M. Webber (1973). "Dilemmas in general theory of planning." *Policy Sciences* **4**(2): 155-159.
RIZA (1985). Omgaan met water (Dealing with water). The Hague, The Netherlands, RIZA.
RMNO (2000). Verslag van discussies met wetenschappers tijdens het NMP4 proces. The Hague, RMNO.

Ros, J. P. M., G. J. Van den Born, E. Drissen, A. Faber, J. Farla, D. Nagelhout, P. Van Overbeeke, G. Rood, W. R. Weltevrede, J. J. Van Wijk and W. H.C. (2003). Methodiek voor de evaluatie van een transitie. Bilthoven, RIVM/MNP.

Rosenhead, J., Ed. (1989). *Rational Analysis for a Problematic World: Problem Structuring Methods for Complexity. Uncertainty and Conflict*. Wiley, Chichester.

Rosenhead, J. (1998). Complexity theory and management practice, http://www.human-nature.com/science-as-culture/rosenhead.html.

Rotmans, J. (1994). Transitions on the move; Global Dynamics and Sustainable Development. Bilthoven, The Netherlands, Rijksinstituut voor Volksgezondheid en Milieu (RIVM).

Rotmans, J. (1998). "Methods for IA: The challenges and opportunities ahead." *Environmental Modeling and Assessment* **3**(3): 155-179.

Rotmans, J. (1999). Integrated Assessment: A bird's eye view. Maastricht, ICIS.

Rotmans, J. (2002). Duurzame ontwikkeling: al lerende doen en al doende leren. *De Kroon op het Werk*. B. Wijffels, H. Blanken, M. Van Stalborch and R. Van Raaij. Amsterdam, NCDO**:** 42-51.

Rotmans, J. (2003). *Transitiemanagement: Sleutel voor een duurzame samenleving*. Assen, Netherlands, Koninklijke Van Gorcum.

Rotmans, J. (2005). *Societal Innovation: between dream and reality lies complexity*. Rotterdam, ERIM, Erasmus Research Institute of Management.

Rotmans, J., C. Anastasi, M. van Asselt, D. S. Rothman, J. Mellors and S. Greeuw (2001). VISIONS: The European Scenario Methodology. Maastricht, International Centre for Integrative Studies (ICIS).

Rotmans, J. and H. De Vries (1997). *Perspectives on Global Change: The TARGETS approach*. Cambridge, Cambridge University Press.

Rotmans, J., J. Grin, J. Schot and R. Smits (2004). Multi-, Inter- and Transdisciplinary Research Program into Transitions and System Innovations. Maastricht.

Rotmans, J., R. Kemp and M. Van Asselt (2001). "More evolution than revolution: Transition management in public policy." *Foresight* **03**(01): 17.

Rotmans, J., R. Kemp, M. Van Asselt, F. Geels, G. Verbong and K. Molendijk (2000). *Transities & transitiemanagement: De Casus van een emissiearme energievoorziening*. Maastricht, ICIS / MERIT.

Rotmans, J., R. Kemp, M. Van Asselt, F. Geels, G. Verbong and K. Molendijk (2001). *Transitions & Transition management: The case for a low emission energy supply*. Maastricht, ICIS.

Rotmans, J. and D. Loorbach (2001). "Transitiemanagement: een nieuw sturingsmodel." Arena/Het Dossier, **6**: 5-8.

Rotmans, J. and D. Loorbach (2007). Transition management: reflexive steering of societal complexity through searching, learning and experimenting. *The Transition to Renewable Energy: Theory and Practice*. J. Van den Bergh and F. R. Bruinsma. Cheltenham, Edward Elgar.

Rotmans, J., D. Loorbach and J. Grin (2004). Transitienotitie. Een reflectie op het Nederlandse transitiebeleid, KSI**:** Maastricht.

Rotmans, J., D. Loorbach and R. Van der Brugge (2005). "Transitiemanagement en duurzame ontwikkeling: Co-evolutionaire sturing in het licht van complexiteit." *Beleidswetenschap* **Juni**.

Rotmans, J., Van der Brugge, R., Loorbach, D., Dijk, M. (2004). Zoeken naar Duurzame Systeeminnovaties. Maastricht, ICIS BV.

Sabatier, P. A., Ed. (1999). *Theories of the Policy Process*. Boulder, Westview.

Sabatier, P. A. and H. C. J. Jenkins-Smith (1999). The Advocacy Coalition Framework, an assessment. *Theories of the policy process*. P. A. Sabatier. Oxford, Westview Press.

Saeijs, H. L. F. (1991). "Integrated water management. A new concept: from treating of symptoms towards a controlled ecosystem management in the Dutch delta." *Landscape and Urban Planning* **20**: 245-255.

Scharpf, F. (1994). "Community and Autonomy. Multi-Level Policy Making in the EU." *Journal of European Public Policy* **1**(1): 219-242.
Scharpf, F. (1997). "The problem solving capacity of multi-level governance." *Journal of European Public Policy* **4**(4): 520-538.
Scharpf, F. W. (1994). "Games real actors could play: positive and negative coordination in embedded negotiations." *Journal of Theoretical Politics* **vol. 6** (no. 1): pp. 27-53.
Schilperoord, M., N. Bergman, A. Haxeltine, J. Köhler, J. Rotmans and L. Whitmarsh (2006). "Modelling Societal Transitions with Agent Transformation." *Submitted*.
Schnellnhuber, H.-J. and V. Wenzel, Eds. (1998). *Earth System Analysis*. Berlin, Springer-Verlag.
Schot, J., Lintsen, H., Rip, A., Albert de la Bruheze, A., Ed. (2000). *Delfstoffen, energie, chemie*. Techniek in Nederland in de twintigste eeuw. Eindhoven, Lecturis BV.
Schot, J., G. Mom, R. Filarsky and P. Staal (2000). Concurrentie en afstemming: water, rails, weg en lucht. *Transport*. J. W. Schot. Eindhoven, Walburg pers. **vol. 5**.
Schot, J. W. and A. Rip (1997). "The past and the future of constructive technology assessment." *Technological Forecasting and Social Change* **54**(2-3): 251-268.
Schumpeter, J. A. (1934). *The Theory of Economic Development*. Cambridge, MA, Harvard University Press.
Schut, E. (2002). Raakt afval uit de mode? *Arena*. **8:** 10-11.
Scott, J. (1991). *Social Network Analysis: a handbook*. London, Thousand Oakes, New Delhi, SAGE Publications.
Senge, P. M. (1990). *The Fifth Discipline: The Art & Practice of The Learning Organization*. London, Random House.
Smith, A., A. Stirling and F. Berkhout (2005). "The governance of sustainable socio-technical transitions." *Research Policy* **34**: 1491-1510.
Smits, R. and S. Kuhlmann (2004). "The rise of systemic instruments in innovation policy." *The International Journal of Foresight and Innovation Policy* **1**(1/2): 4-32.
Social Learning Group (2001). *Learning to manage global environmental risks*. Cambridge, Massachusetts, The MIT Press.
Sondeijker, S., J. Geurts, J. Rotmans and A. Tukker (2006). "Imagining sustainability: The added value of transition scenarios in transition management." *Foresight* **8**(5): 15-30.
Spaargaren, G., T. Beckers, S. Martens, B. Bargeman and T. Van Es (2002). Gedragspraktijken in transitie. Tilburg/Wageningen, Globus.
Spakman, J., W. F. Blom, R. F. J. M. Engelen, D. Nagelhout, G. A. Rood, J. P. M. Ros, M. W. van Schijndel, J. J. van Wijk and H. C. Wilting (2002). Integraal instrumentarium voor evaluatie van transities: Methodologie en resultaten. Bilthoven, RIVM**:** 54.
Stacey, R. D. (1993). *Strategic Management and Organisational Dynamics*. London, Pitman.
Stacey, R. D. (1996). *Complexity and Creativity in Organizations*. San Fransisco, Berrett-Koehler.
Sterman, J. (2006). "Learning from Evidence in a Complex World." *American Journal of Public Health* **96**(4): 505-514.
Stipo-Consult (2005). Regional spatial structure plan Parkstad Limburg. P. Limburg.
Stones, R. (2005). *Structuration Theory*. Houndmills-New York, Palgrave.
Taanman, M. (2004). Diffusie van Waterstoftechnologie. *Technology and Society*. Eindhoven, Technical University Eindhoven.
Taanman, M., E. Roelofs, S. Emmert, R. Weterings, H. Diepenmaat and M. Van de Lindt (2007). "Monitoring transitions: a new challenge for innovation practice and policy." *International Journal for Foresight and Innovation Policy* ***submitted***.
Taskforce-EnergyTransition (2006). Meer met Energie. The Hague, Ministry of Economic Affairs.
Teisman, G. R. (1992). *Complexe besluitvorming, een pluricentrisch perspectief*. 's Gravenhage, Elsevier.
Teisman, G. R. (2005). *Publiek Management op de grens van Orde en Chaos*. Den Haag, Academic Service.

Tellegen, E., De Jong, P., Slingerland, S., Wijmer, S., Wolsink, M. (1996). Nutsbedrijven en de beperking van huishoudelijk milieugebruik in Nederland. *Milieu als mensenwerk*. B. van Heerikhuizen e.a. Groningen, Wolters-Noordhoff.

Ten Pierick, E., S. Goddijn and M. Meeusen (2006). Naar een gereedschapskist voor transitiemonitoring. Den Haag, LEI.

Thatcher, D. (2006). "The Normative Case Study." *American Journal of Sociology* **111**(6): 1631-1676.

Thompson, M., R. Ellis and A. Wildavsky (1990). *Cultural Theory*. San Francisco, Oxford Boulder.

Twynstra Gudde, S. C., Hötte Milieu Management (2000). Transitions: can three people change the world?, Ministry VROM

UN (1992). Agenda 21. Division for Sustainable Development. United Nations. New York, United Nations.

UN (1997). Global Change and Sustainable Development: Critical Trends. E. Matthews, Rotmans, J., Ruffing, K., Waller-Hunter, J., Zhu, J. New York, United Nations, Department for Policy Cordination and Sustainable Development.

UN (2005). The Millenium Development Goals report. New York, United Nations.

Utterback, J. (1994). *Mastering The Dynamics of Innovation*. Boston, MA, Harvard Business School Press.

Van Asselt, M. (2000). Perspectives on uncertainty and risk: the PRIMA approach to decision support. Maastricht, Proefschrift, Universiteit Maastricht.

Van Asselt, M., Rijkens-Klomp, N. (2002). "A Look in the Mirror: Reflection on participation in Integrated Assessment from a methodological perspective." *Global Environmental Change – Human and Policy Dimensions* **12**(3): 167-184.

Van Asselt, M. B. A., Rotmans, J, Rothman, D.S., Ed. (2005). *Scenario Innovation: experiences from a European experimental garden*. London, Francis and Taylor.

Van Baren, N. (2001). Planhierarchische oplossingen: een bron voor maatschappelijk verzet. Amsterdam, Universiteit van Amsterdam.

Van de Kerkhof, M. (2004). *Debating Climate Change*. Utrecht, Lemma.

Van de Lindt, M., Loorbach, D. (2006). Inspiration document transition arena DuWoBo. Delft-Rotterdam, TNO-Drift.

Van de Lindt, M., Rijkens-Klomp, N., Loorbach, D. (2002). Situatieschets Parkstad Limburg: een regio in transitie. Maastricht, ICIS BV.

Van de Lindt, M., J. Rotmans, N. Rijkens, W. Rennen and L. D. (2002). Kwetsbaarheid en maatschappelijke dynamiek. *Tussen souterain en dakterras*. The Hague, VROM.

Van den Bergh, J., A. Faber, A. M. Idenburg and F. H. Oosterhuis (2005). Survival of the Greenest: Evolutionaire economie als inspiratie voor energie- en transitiebeleid. Bilthoven, RIVM**:** 152.

Van den Bergh, J. and J. Gowdy (2000). "Evolutionary Theories in Environmental and Resource Economics: Approaches and Applications." *Environmental and Resource Economics* **17**: 37-57.

Van den Bosch, S. and M. Taanman (2006). *How Innovation Impacts Society. Patterns and mechanisms through which innovation projects contribute to transitions*. Innovation Pressure Conference, 15th - 17th March, Tampere, Finland.

Van der Brugge, R. (2005). *A complexity informed heuristic for transition dynamics in society*. Complexity, Science and Society, Liverpool.

Van der Brugge, R., J. Rotmans and D. Loorbach (2005). "The transition in Dutch water management." *Regional Environmental Change* **Volume 5**(1).

Van der Brugge, R., Rotmans, J. (2006). "Towards transition management of European water resources." *Water Resource management* (Special Issue on advances in global change research).

Van Dijk, J. (2001). Netwerken, het zenuwstelsel van onze maatschappij. Twente, Universiteit Twente.

Van Herwijnen, T., Schoof, A., Faaij, A., Bergsma, G., Loorbach, D., Schaeffer, G.J., de Keizer, I. (2003). Visie op biomassa. De rol van biomassa in de Nederlandse energievoorziening 2040 (Vision on biomass. The role of biomass in the Dutch energy supply 2040). The Hague, The Netherlands, Ministry of Economic Affairs.
Van Hilten, O., J. Battjes, J. Dijkstra, K. Hemmes, M. Kaal, P. Lako, R. Nahuis and A. De Raad (2000). Energietechnologie in het spanningsveld tussen klimaatbeleid en liberalisering. Petten, ECN.
Van Humbeeck, P., I. Dries and J. Larosse (2004). Linking innovation policy and sustainable development in flanders. Brussels, IWT.
Van Melle, M. (2003). Een stad met een luchtje. *Ons Amsterdam*. **Mei:** 182-187.
Van Notten, P. (2005). Writing on the wall. Scenario development in times of discontinuity. Maastricht, Proefschrift, Universiteit Maastricht.
Van Notten, P. W. F., Rotmans, J., Van Asselt, M. B. A., Rothman, D. S. (2003). "An updated scenario typology." *Futures* **35**(5): 423-443.
Van Twist, M., M. Kort and M. Timmerman (2004). Organiserend vermogen in de stad. *Eindrapport*. Nijmegen/Den Haag, STIP.
Van Twist, M. and E. Schaap (1991). "Een theorie over autopoietische systemen voor de sociale wetenschappen: een vorm van eigentijds geloven." *Beleidswetenschap* **4**.
Van Velzen, K., D. Samsom, W. Duyvendak, T. Huizinga-Heringa and C. Van der Staaij (2003). Motie van het lid Van Velzen c.s. T. Kamer, Sdu Uitgevers. **ISSN 0921 – 7371**.
Varela, F., H. Maturana and R. Uribe (1974). "Autopoiesis: The organization of living systems, its characterizationand a model." *Biosystems* **5**: 187-196.
Vellema, S., D. Loorbach and P. Van Notten (2006). "Strategic transparency between food chain and society." *Production planning and control* **17**(6): 624-632.
Verbong, G. (2000). De Nederlandse overheid en energietransities: Een historisch perspectief. Eindhoven, Stichting Historie der Techniek.
Verbong, G. and F. Geels (2006). "The ongoing energy transition: Lessons from a socio-technical, multi-level analysis of the Dutch electricity system (1960-2004)." *Energy Policy* **35**(2): 1025-1037.
Vickers, G. (1965). *The Art of Judgment, a study in policy making*. New York, Basic Books.
Vickers, G. (1983). "Human Systems are Different." *Journal of Applied Systems Analysis* **10**: 3-13.
Vis, J. (1998). "Kantelwagens en afsluitbare vuilnisemmers." *Ons Amsterdam*, **September**: 216-220.
Visser, J. and A. Hemerijck (1997). *A Dutch Miracle; Job Growth, Welfare Reform and Corporatism in the Netherlands*. Amsterdam, Amsterdam University Press.
Vollenbroek, F., R. Weterings and M. Butter (1999). Technology options for Sustainable Development. OECD. Paris, OECD**:** 83-95.
Von Bertalanffy, L. (1956). "General Systems Theory." *General Systems* **1**: 1-10.
Voss, J., D. Bauknecht and R. Kemp, Eds. (2006). *Reflexive Governance for Sustainable Development*. Cheltenham, Edward Elgar.
Voss, J. and R. Kemp (2005). *Reflexive Governance for Sustainable Development. Incorporating Feedback in Social Problem-Solving*. ESEE conference, Lisbon.
VROM-raad (2001). Waar een wil is, is een weg: advies over het NMP4. The Hague, Ministry of VROM.
VROM (1989). Nationaal Milieubeleidsplan (NMP). The Hague, Ministry of VROM.
VROM (1997). Nota Milieu en Economie. The Hague, Ministry of VROM.
VROM (2001). Nationaal milieubeleidsplan 4: een wereld en een wil. Den Haag, Ministerie van volkshuisvesting, ruimtelijke ordening en milieu.
Walker, B. (2004). *Ecosystem Management and Biodiversity*. EFIEA, Berlin.
Walters, C. (1986). *Adaptive Management of Renewable Resources*. New York, Macmillan.
WCED (1987). *Our Common Future*. Oxford, University Press.

Weber, K. M. (1997). Innovation Diffusion and Political Control of Energy Technologies: A comparison of combined heat and power generation in the UK and Germany. *Insititut für Sozialforschung*. Stutgart, Universität Stutgart.

Weiss, A. and E. Woodhouse (1992). "Reframing incrementalism: A constructive response to the critics." *Policy Sciences* **25**: 255-273.

Wiek, A., C. Binder and R. Scholz (2006). "Functions of scenarios in transition processes." *Futures* **38**: 740-766.

Wijers, E. (2004). Transition management in the international arena: The effects of national cultures on the implementation of transition management. *ICIS*. Maastricht, University of Maastricht.

Wildavsky, A. (1979). *Speaking truth to power. The art and craft of policy analysis*. Boston, Little, Brown & Co. .

Winsemius, P. (1986). *Gast in eigen huis: beschouwing over milieu-management*. Alphen aan den Rijn, Samsom.

Wolsink, M. (1996). Het NIMBY-denken: eindpunt of startpunt van een leerproces? *Leren met beleid*. J. Eberg, R. Van Est and J. De Graaf. Amsterdam, Het Spinhuis**:** 19-40.

WWF (1992). Levende Rivieren (Living rivers). Zeist, The Netherlands, World Wildlife Fund.

Yammarino, F. J., S. D. Dionne, J. U. Chun and F. Dansereau (2005). "Leadership and levels of analysis: A state-of-the-science review." *The Leadership Quarterly* **16**: 879-919.

Yin, R. (1984). *Case study research: Design and methods* (1st ed.). Beverly Hills, CA, Sage Publishing.

Summary

This thesis presents a new mode of governance for sustainable development: transition management. It includes a conceptual approach on how to deal with governance and structural societal change and an operational policy model to implement this approach. This thesis was the result of an inter- and transdisciplinary research process based on an iteration between analysis, deduction and integration of different disciplinary insights, and explorative, practical and inductive case studies and projects. Transition management aims to deal with persistent societal problems by exploring and furthering more sustainable routes. The basic rationale behind transition management is that we are faced with societal problems of such complexity and magnitude and at the same time the challenge to develop more sustainably, that traditional policies, short term solutions and specialized approaches do not suffice here. However, small-scale innovations and innovators always emerge in periods of increasing instability and persistent problems and induce all sorts of changes (technological, economic, behavioral, institutional, spatial etc.). The creativity, innovative power and promise of sustainable change are, however, barely used in our present policy and institutional system. Transition management tries to empower and mobilize the undercurrent of sustainable development and innovation through offering a coherent and systemic approach in which a shared perspective and action plan can be developed without losing the competition, pluriformity and initiative of societal actors. Through an intelligent process of anticipation and adaptation, networks of innovators are developed and empowered to develop shared transition visions and agenda's and diffuse all sorts of innovations into society. This way, a self-organizing movement and culture can be promoted that will self-reinforce the societal innovation process.

Transition management is in part analytical and in part practical. Analytically, the transition management approach is based on the transition concept, complex systems thinking, sociological and governance theories. We have compared these different scientific fields, deduced generic insights and analytically generalized these in terms of basic principles for governance of complex societal systems. We have positioned transition management in this context as complexity based governance specifically targeted at stimulating and redirecting transitions towards sustainable development. In practice, we have further developed the transition management model in various experimental projects and empirical processes. These were based on the governance principles that were reformulated, enriched and further developed during their implementation based on insights and experience from practitioners as well as systematic reflection. The central concept in this thesis is the transition arena: a scientifically underpinned operational model for coordinating and structuring transition management processes (especially in the predevelopment phase). The transition arena is a legitimized mental, physical and institutional space for experimentation, envisioning and network-building. In the transition arena, different types of innovators with various backgrounds, perspectives and ambitions are brought together and develop shared long-term perspectives and a transition agenda.

The results of this thesis are a scientific grounding of the transition management approach and an operational governance-model which has been (successfully) applied and evaluated. The transition management framework provides

the link between the approach and the model: it enables us to analyze transition management activities in historic and ongoing transitions in a descriptive sense and helps us to structure and coordinate ongoing transitions and transition management in a prescriptive sense. This thesis offers a source of inspiration for scientists as well as practitioners and can be used to develop, structure and coordinate transition management projects and processes at all levels. The rapid development of theory and practice of transition management over the period 2001-2006 as well as the enthusiasm with which numerous individuals are nowadays involved in transition management are indicators for the potential of transition management. This thesis in a sense gives an overview of the successful first phase, but also states that the biggest challenges are still ahead. These challenges are scientific as well as practical; further grounding and underpinning transition management scientifically in various scientific disciplines while simultaneously maximizing the effect of transition management processes on regular policies and institutions.

Firstly, we sketch **the context and need for transition management** (Chapter 1). To effectively deal with persistent societal problems in the long-term, transitions are necessary. Persistent problems are defined as problems in which multiple actors are involved, that occur (differently) on different levels of scale, that are complex and integrated (multi-domain), that require a long-term process to deal with, and that are deeply rooted in our institutional structures Examples of such problems are unsustainable energy-supply, agricultural, mobility, health-care or education systems. These systems are currently organized in such a way (based on specialization, efficiency and resource-intensity) that various symptoms of unsustainability can be witnessed: energy-crises, pollution, environmental degradation, congestion, health-issues etc. Rather than to only deal with the symptoms, transitions are about transformation of the basic structures of a societal system: a fundamental change in culture, structure and practices. These transitions are recurring patterns of societal change, and through a better understanding of the patterns and mechanisms of these transitions, we are able to more strategically and systematically influence them. This 'management' of transitions can by definition not be a top-down, imperious approach; the most we can achieve is influencing the speed and direction of transitions. The ambition of transition management is to promote sustainable development: continuous societal improvement in which economic vitality is in balance with resource use, social welfare and in general cultural and societal diversity. Sustainable development is thus not seen as a blueprint or fixed goal, but rather as guiding notion that allows us to search for long-term collective goals and ambitions, to experiment on the short-term and to regularly assess the progress made.

This approach to transitions and sustainable development has its **implications for the role of research and of researchers**. In addition to disciplinary research, innovative approaches are needed that are based on a combination of deduction, theory development and induction, practical experiments (Chapter 2). This thesis has a general orientation and ambition (developing and operationalizing transition management), but the research process itself has not been structured, nor were the specific outcomes defined beforehand. Only afterwards was it possible to schematize the research process and clearly indicate where concepts and models originated from. The main ingredients of the analytical research have been a multi- and inter-disciplinary literature review and integrated assessment

to develop the transition management approach. Explorative cases and projects were used to develop the transition management model. In the cases and projects, the research approach was a mix of action research, scientific exploration, facilitation and consultancy. Theoretical ideas were tested in the cases, and transition arena processes were managed and reflected upon, leading to adjustments and refinement of the theoretical notions. The different research approaches and methods used thus have been combined and have led to significantly different results than a regular or disciplinary approach would have had. This thesis has, because of this, integrated a theoretical perspective with a very concrete model for implementation in a very structured and well-grounded manner.

The deductive approach is structured as follows. Based on interdisciplinary research using complex systems theory, sociological theory and governance theory, we formulate **basic starting points for complexity based governance** (Chapter 3). We combine insights from complex systems theory to theories on social change and complexity in a framework for analyzing complex adaptive societal systems. Governance theory is then used to identify steering and management mechanisms that relate to the patterns, characteristics and dynamics of complex societal systems. The basic outcome of the interdisciplinary and synthesizing literature study is that by starting from societal systems and generic patterns observed in these systems, we are able to conceptualize a new mode of governance that is partly based on structured processes, formal procedures and institutionalized processes and in part on creating room for innovation and surprise (emergence), anticipating long-term dynamics, informal and creative agenda-building and networking processes and adaptive explorative innovation approaches. Together, the complexity governance approach thus offers an integrated perspective on societal steering: all actors influence societal change in one way or another. Based on a thorough understanding of these processes it should be possible to influence these, in a sense meta-governance: influencing (governance) actions.

Next, we outline the **transition management approach as a new mode of governance** based on network-steering, anticipative long-term goal setting and adaptive short-term exploration (Chapter 4). The transition management approach combines visionary thinking and short-term action: transitions-thinking (in terms of societal systems, different levels, different phases and multiple actors) and transition management. Through integrated and systems thinking it is possible to coordinate and structure innovative actions and actors is such a way that they will start to reinforce each other and are ultimately able to more rapidly and more directed break through existing equilibria. Transition management is not able to initiate transitions, but is meant to further transitions, is able to build on ongoing transitions, identify these in an early stage, and systematically reflect upon possible future trajectories. This is the basis to empower innovative individuals and organizations by offering a coherent way of thinking, a shared goal (transition), a network of actors, strategic instruments and room for innovation (the transition arena). The transition management approach fits within the transition from government to governance and is explicitly based upon pre-existing theoretical and practical governance models and approaches. Transition management combines elements of long-term planning with incrementalism and relies simultaneously on markets and networks. It is, however, not a simple mix of these approaches but a distinctive governance approach because the explicit societal focus, the normative goal of transitions to sustainable development and

its selective participatory approach. The link between transition management and sustainable development presumes a problem-structuring process directed towards development of shared perspectives and language, it presumes specific types of visions and it requires specific types of innovations. Rather than to only offer a process-model, transition management explicates the link between process and substance: the state of the system determines the way it can be influenced and a sustainable system should always be the objective of process management.

The **transition management framework** is then presented as the link between the approach and the model (Chapter 5). The transition management framework structures different types of governance activities according to their level of abstraction: strategic, tactical and operational transition management. Each governance–type is characterized based on its focus (long-, mid-, or short-term) and type of actor involved. The three transition management types are not deterministic: they concern fluid, interacting and co-evolving processes of governance. The aim of transition management is to align activities at these levels that are directed towards sustainable development and enhance the chances for a breakthrough and up-scaling of these activities. The transition management types (descriptive) are translated into a process scheme (prescriptive) that distinguishes four different activity-clusters and integrated this with the complexity governance perspective. A transition arena is used as an instrument to connect innovators within the system, structure a complex societal problem and develop a shared vision (strategic). Transition networks and coalitions are used as means to involve specific organizations and interests and have these contribute to the desired change at the level of structures, routines and regulations through the development of a shared transition agenda (tactical). Transition experiments are the context within which possibilities and barriers for the transition agenda are explored and a wide range of actors is involved (operational). Transition monitoring and evaluation are seen as cross-cutting activities that need to generate interaction and modulation between the levels and phases. The multi-level, multi-phase framework can be used descriptively as well as prescriptively: to analyze and to structure transition management processes.

To test and refine the transition management framework as analytical structure, we have analyzed **the transition in Dutch waste management between 1960 and 2000** (Chapter 7). This transition is described as transition from local and unorganized waste handling in the late 1950's to centralized, large-scale, highly professional waste market by the end of the 1990's. The transition was the result of external changes (pressures), innovations, crises, self-organization of social actors as well as planning and policy. This transition was not managed integrally, but elements of transition management were identified. For example: the influence of pioneers and strategic individuals, the influence on long-term change of new visions or guiding principles at the strategic level and the guiding and channelling role of certain institutional changes and innovations around 1990. The transition analysis suggests that a new transition seems inevitable because the regime is under pressure from landscape changes (sustainability, resource prices, Europeanization) and innovations (new materials, new technologies, regional systems). The amounts of waste produced keep increasing but the pressure to fundamentally reduce waste-quantities is also growing. A new transition to sustainable waste management would therefore inevitably imply

a decrease of waste management and waste-market in favour of reduction of materials use and output. This in turn would require new waste management structures and practices: instead of regulating, enforcing and managing it would imply negotiation, co-production, education etc.

The analysis and the reflection upon future waste transitions was the shared result of a research project and a participatory project with Flemish waste management organization OVAM. In this sense does this case illustrate the possible function of historic transition narratives; they can be an instrument for co-construction of a shared historic narrative and systemic understanding of a present day situation. Without broad consensus on details, explanations or causes, it proved to be worthwhile to invest in such a shared point of departure because it enables fundamental reflection upon the current state of the system and hence development of a shared orientation for the future. It illustrated that problem structuring on the level of a societal system (strategic transition management) is no matter of details but of interpreting long-term patterns, short term dynamics and causal relationships. In the OVAM-project, the historic analysis of the Dutch case was translated to the Flemish case and then used as a basis for a position paper on the future of waste management. Although the Flemish and Dutch waste management have evolved differently over the last four decades, there are a number of striking similarities such as the driving factors, the development pathways and their current system state. Hypothetically, they could share the same conditions and characteristics for a new transition in waste management.

The **transition arena** is worked out in further detail as a specific instrument for transition management (Chapter 6). In a transition arena initially a small group of innovative individuals (max. 15) is brought together based on a strict selection process: they need to have specific capabilities or skills (systems thinking, communication skills, and creativity), they need to have 'leadership' capacity and they need to be able to translate an abstract idea or vision to their specific professional context. In terms of group composition, a representative sample is sought in terms of different backgrounds and perspectives. The transition arena analyzes and structures a complex societal problem using systems thinking and an integrated systems analysis prepared by an interdisciplinary expert group. Then, based on a thorough understanding of the persistency of the problem the transition arena formulates a sustainability vision: a qualitative and inspiring desired future state of the system allowing for different, sometimes conflicting more specific images. Then, sub-transitions (-themes) are selected for which sub-groups, headed by transition arena members are developed. These sub-groups develop transition images and transition paths for the different themes that are ultimately integrated with the problem analysis and vision in the transition agenda. This process is coordinated, organized and facilitated by the transition team: a group in which the initiating institution (often but not necessarily governmental), transition management experts and domain experts collaborate.

This transition team also deals with the selection and design of the transition arena. The actual operational form of a transition arena depends directly on the type of transition and the direct (policy) context in which it is implemented: this determines where to start, what instruments to use, which actors to involve and so on. So while the elements will probably all be part of any operational transition arena process, their interaction, relative importance and effect differ. The

transition arena is used to create space for innovators to co-create visions and pathways for sustainable development. Rather than to work from within existing structures and regimes, the transition arena approach offers a way to develop a parallel 'shadow track' besides the regular policy arena in which long-term concerns, balancing of societal goals, objectives and ambitions, and problem structuring at a societal systems level can take place. The transition team is also concerned with the interaction between the transition arena and regular policies. Around the transition arena process, all sorts of interactions and activities will emerge that enforce the arena process or possibly complicate it. The dynamics created by the transition arena in that sense are part of transition management because it is how ideas diffuse, and regular policies are influenced. This is called *transitionizing*: influencing regular policies with transition thinking through the use of the transition arena. The transition arena is in this view used as an (systemic) instrument to develop and empower coalitions and networks to diffuse a new vision and agenda. Within several operational contexts, the model has proven to be successful and the different elements incorporated in the model have proven their respective value in an operational policy setting.

The transition arena model was first developed, implemented, evaluated and refined in the context of a two-year envisioning project for the region Parkstad Limburg (Chapter 8). The Parkstad Limburg region (in the south of the Netherlands) encountered numerous problems (ageing, environmental issues, political lethargy, low education and employment levels for example) which the local government institutions were unable to deal with. The transition arena approach was used as an experiment to develop, instead of a policy vision and agenda, a societal vision and agenda for the region. A transition arena of 16 persons out of which some 5 individuals took the initiative, developed a shared agenda for sustainable development of the region. In their vision and agenda, multiple goals and ambitions were formulated based on the characteristics of the region, possible future developments and combinations between different sectors and policy domains. Weaknesses were transformed into possible strengths and possibilities for transformation, innovation and sustainability were made tangible. The strengths of the approach became clearer afterwards, when the individuals involved showed to have internalized transitions thinking and their own agenda and diffused these throughout the region. This led to various and significant follow-up activities: in terms of new activities of individual organizations, new policies, new coalitions, more involvement in the region, a better regional profile and strategy and so on. Although it is too early to conclude on the over-all transition of the region, it is already clear that this project provided a solid and inspiring basis.

It was the first actual transition management project in which theory and method of transition management were developed. More importantly perhaps, the project achieved something that until then was not realized by numerous efforts: a shared sense of urgency felt by relevant actors in the region and a change in thinking reactive to more proactive. The societal and explorative approach underlying transition management has thus constituted a unique process and results. As a case for transition management this project has thus been more than successful in terms of further theory and concept development as well as in terms of achieving concrete, and different from regular, results. In that sense a process has started that has become irreversible and has become part of the

regular structures and institutions. For the transition management model and the approach, numerous lessons were learned in this project, for example: that the transition arena itself is an instrument to influence regular policy, how important it is to structure and direct the debates to achieve collective outcomes, that it is necessary to select participants based on capabilities (competences) and background, and when and how to open up the transition arena to regular policies.

The importance of structuring discussions, developing a structured process-architecture and of reflecting upon role and practice of the involved actors can be illustrated by looking at the national transition policies (Chapter 9). We describe **how transition management was adopted into national policy** and then **describe and evaluate the energy transition process** in specific. The adoption of transition management by Dutch government itself was a result of policy learning: through a co-production between transition researchers and government officials, the transition (management) concept was developed and internalized. A number of key individuals initiated and inspired different transition management processes within different ministries, of which the ministry of EA was most successful so far. This ministry has managed over the past five years to develop a very broad network of actors at different levels (taskforce, platforms and coalitions) and broad array of visions, agenda's and experiments. The process illustrates the innovative power and potential of the transition management approach and at the same time shows some major barriers for successful implementation. A central observation that returns over and over again is that the implementation of the approach led to a more reflexive attitude of the ministry and a reformulation of its own role and functioning. Based on experiences, evaluation and criticism, the ministry has continuously adjusted and improved the process. This in itself can be considered a result (policy learning) and is an example of *transitionizing*: fundamentally changing the regular policy context through a well-coordinated and structured transition arena. This learning was supported by the dynamics that emerged around the transition platforms in terms of experiments, coalitions, new platforms and high-levels groups that were set-up. The success of the process helped the ministry to gain confidence about the approach, communicate about it more internally and externally and in general attract more attention, money and actors. In this sense the process started to reinforce itself, another indication that the emerging process around the transition arena is at least as important as the transition arena process itself.

Finally, we formulate conclusions, synthesizing insights and major issues for future transition management research. We conclude that so far major progress has been achieved and transition management has been highly successful so far. In terms of research, where nowadays quite a number of researchers operate in transition research projects, and in terms of practice, where hundreds of professional are involved, has transition management inspired and motivated individuals to do things differently. Various transition agendas have been developed in transition arenas that influence regular policies. The number of disciplines, domains and even countries in which transition management is used still expands, underlining the generic applicability as well as the need for such a new mode of governance that is felt in society. However, transition management is still rapidly developing and there is a diversity of transition management practices emerging. It is too early to conclude that transition management is the only or even the

best mode of governance for sustainable development, but since no alternatives are offered and so far no fundamental scientific or practical objections have been raised against transition management it certainly seems the most promising perspective for actually realizing sustainable development.

For the future this means that the exciting process of developing transition management in theory and practice will continue with increased speed since the community of practitioners and researchers is still growing. To achieve success, we need to firmly ground transition management in existing disciplines and maximize the impact of transition management processes on regular policies. This means in the first place a further deepening of transition management scientifically by engaging in debate with disciplines such as policy and social sciences, organizational and business sciences, psychology, law and perhaps even philosophy. Related to this does the transition management model also need to be deepened by further developing theory and practice of especially actor selection and of organization and coordination. It also implies a broadening of the transition management approach and model to other societal domains (for example health-care, education, the welfare-state, integration etc.) and internationally. Finally, it means an up-scaling of transition management in terms of dealing with issues of power, of institutionalization of influencing politics and major vested interests. Only when the transition community, now already starting to develop into a niche-regime itself, grows into a real societal movement that can generate enough power and critical mass will transition management be truly able to influence and guide transitions to sustainable development.

About the author

Derk Loorbach (1975) was born in Rotterdam, the Netherlands. He studied Arts and Science at Maastricht University. In 2000, he graduated with a specialization in European integration and multi-level governance. His professional career started at the International Centre for Integrative Studies (ICIS), Maastricht University, a research and consultancy institute that focuses on interdisciplinary and applied research related to sustainability issues. In 2004, Derk went through a personal transition when he became husband and father and at the same time moved from Maastricht to Rotterdam. Here, he was one of the first pioneers of the Dutch Research Institute for Transitions (Drift), Erasmus University Rotterdam, and is now involved in a large number of activities in both research, consultancy and education. Besides his family and transitions, making music is Derk's third passion in life; he plays bass guitar in a rock band.