

# Governance and Transitions

*An multi-level policy-framework based on complex systems thinking*

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## Abstract

Environmental and social issues such as climate change, energy-supply problems, agricultural reforms and mobility problems are so complex and uncertain that traditional, rationalist problem-solving approaches are no longer sufficient. Traditional bureaucracies, highly specialized and focused on the short-term, do not seem to be able to come up with the required solutions and strategies. Governing our modern society in the direction of sustainable development will therefore require new forms of governance that explicitly deal with the diversity and divergence in societal and policy-processes.

Bureaucracies acknowledge the problems related to legitimacy, efficiency and accountability of contemporary government, and are therefore trying to make the shift from government to governance, whereby all societal actors are interacting in complex networks (Castells 1996, Teisman, 1998). In practice however, most governance-approaches fail because of a lack of methodology; the often-random selection of participants and the lack of coherence in and between different policy-processes. Because an integrative framework based on understanding of processes of societal change is absent, the transformation of government will not lead to better policymaking but rather to even more diffuse policy-processes.

This paper further develops the model of transition management (Rotmans et al, 2001, NMP4, 2001, Loorbach, 2002), whose main elements are *multi-actor governance, envisioning, agenda building and experimentation*. The paper presents multi-level governance-framework, building on the concept of transition, recent literature on governance-studies (Scharpf, 1999 Hooghe and Marks, 2001) and complex systems thinking (Midgley, 2000, Holland, 1995). The governance-framework discriminates between strategic, tactical and operational levels of governance and allows for a focused selection of participants, timing of activities and choice of instruments during policy processes for sustainability. Transition management can thus be used to structure societal learning processes and serve to integrate policy and societal domains. The framework will be illustrated using recent experiences in the Netherlands.

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## Introduction

Our modern society is developing into a complex network-society with a growing number of so called 'persistent' problems that seem impossible to solve with existing instruments or through existing institutions. From an integrated systems perspective, these problems are characterized by a large complexity, structural uncertainty, large number of actors involved and the steering problems associated (Rotmans, 2002). More often than not, these problems are unstructured (e.g. Hisschemöller, 1993), different actors perceive such problems completely different and agreement on solutions is absent. We therefore use the term 'persistent' problems. Such problems can be seen in sectors such as agriculture, mobility, housing and energy-supply and are embedded in the existing societal structures, its institutions and its actors. In order to properly address societal complexity and diversity of such nature, new policy- or governance-approaches have to be developed. In this paper a multi-level framework is presented for a form of evolutionary (Kemp and Loorbach, 2003) or complex systems governance that is called 'transition management' (Rotmans et al, 2000). This framework is based on the coupling of complex systems thinking (Midgley, 2000; Holland, 1995) and governance theory and thus presents a complex-systems base perspective on governance for sustainable development.

The concept of transition has been applied in many scientific disciplines<sup>2</sup> but generally refers to the idea of short revolutionary period breaking incremental or gradual processes of change in complex systems. Such transitions, or structural changes, are the result of many causal interactions on a number of different levels. Using this complex systems-approach, a societal transition can be defined as a pervasive process of change whereby society, or a sub-system of society structurally changes (Rotmans et al., 2001). Transition processes are long term (ca. 25 yrs.) processes of change that are co-evolutionary by nature and involve a broad range of societal actors. Transitions are therefore always the result of interacting economic, social, technological, institutional and/or ecological developments. By definition, transitions are not caused by single events or developments but always have a number of causes that interact.

Transitions can be analyzed using at least two basic concepts: the multi-level and multi-phase concept (Van der Brugge et al, 2004). The multi-level concept (Geels and Kemp, 2000) distinguishes between the societal level of trends and autonomous developments, the regime level of institutions and routines, and the innovation level of individuals and ideas. The multi-phase level discerns between different stages (predevelopment, take-off, acceleration and stabilization) of the transition and their specific (systemic) dynamics. Combining the multi-level with the multi-phase concept will lead to a better understanding of the dynamics of societal processes of change and of the possibilities of coping with these processes in a more structured and coordinated way.

Over the last decade, persistent problems have become increasingly manifest at the societal level, leading to the ambition of Sustainable Development as a general direction of development. In recent years, it has become clear that structural, factor 20 (DTO) changes or even transitions (Rotmans et al, 2000; NMP4, 2001) are needed to achieve sustainable

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<sup>2</sup> Originally used in the term 'demographic transition', the transition concept has been applied in psychology, organisational science, biology, chemistry etc. (see also Gersick, 1991)

development. In the summer of 2001, the Dutch government adopted the concepts of transitions and transition management as a form of governance aimed at generating a sustainable development (NMP4, 2001). It was presented a novel form of policy-making that had to enable long-term, structural innovation of a number of societal systems (energy-supply, agriculture, mobility and use of biodiversity and natural resources). The concept of transition has been applied in many scientific disciplines<sup>3</sup> but generally refers to the idea of short revolutionary period breaking incremental or gradual processes of change in complex systems. Such transitions, or structural changes, are the result of many causal interactions on a number of different levels.

### **Transitions and the complex dynamics of change**

The behaviour of complex systems has become a focus of study in many scientific disciplines (Midgley, 2000; Holland, 1995). Complex systems' thinking is strongly associated with ecological and evolutionary studies (e.g. Gunderson and Holling, 2002) since similar dynamics are observed in both fields of study: emergence, co-evolution, feedbacks, variation and selection etc. The Darwinian paradigm of continuous gradual evolution however is not supported by studies of complex ecological systems (Gould, 2002; Gunderson and Holling, 2002). Such studies, along with similar studies into complex-systems dynamics in other fields, suggest the model of punctuated equilibrium; short periods of revolutionary change that interrupt longer periods of gradual incremental change. Combining the punctuated equilibrium model with the notion of complex societal systems leads to the idea of transition as structural changes at the level of a particular system that occur in a relatively short period of time.

Although transitions are thus characterised by non-linear behaviour, the process itself is a gradual one, typically spanning one or two generations (25-50 years).<sup>4</sup> Historic analysis of societal transitions<sup>5</sup> (Verbong, 2000, Geels, 2002, Loorbach et al. 2004) suggests that transitions go through different stages (Rotmans et al. 2001). The nature and speed of change differ in each of the transition stages (see Figure 1):

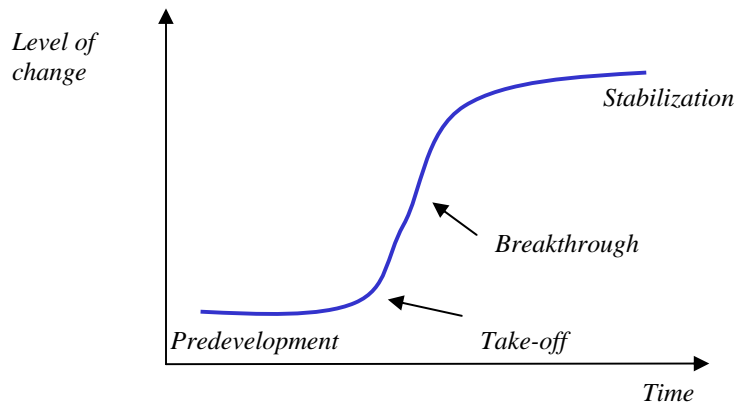
- In the *predevelopment* phase there is very little visible change on the societal level but there is a lot of experimentation
- In the *take-off* phase the process of change gets under way and the state of the system begins to shift.
- In the *acceleration* phase structural changes take place in a 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 *stabilisation* phase the speed of societal change decreases and a new dynamic equilibrium is reached.

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<sup>3</sup> Originally used in the term 'demographic transition', the transition concept has been applied in psychology, organisational science, biology, chemistry etc. (see also Gersick, 1991)

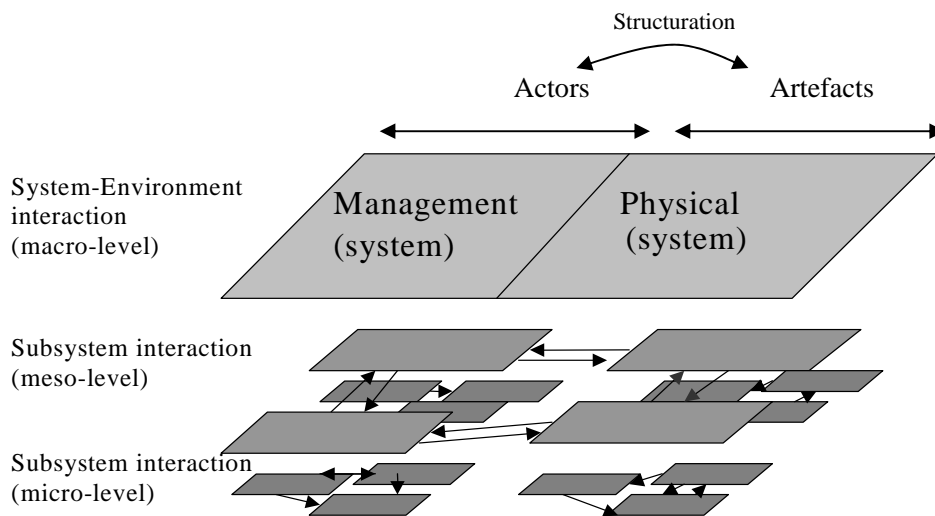
<sup>4</sup> The time span is not a defining characteristic but a result.

<sup>5</sup> The transition concept has always been used to distinguish different phases: for example the demographic transition is visualised by a double s-curve; one indicating birth- and one indicating death rates (Davis, 1945).



**Figure 1: Four phases of transition** (source: Rotmans, et al., 2000 and 2001)

In transitions there is multiple change at different levels. In analysing societal systems three (functional) levels that are influencing each other are distinguished: niches, regimes and landscape. The multilevel model (see Figure 2) originates from innovation studies (Rip and Kemp, 1998 and Geels, 2000, 2002). The central level is the meso level of *regimes*. It is the level of a specific socio-technical domain that is at the heart of the analysis, like the energy domain, the passenger mobility domain, the food production and consumption domain, etc. The regime refers to institutions: dominant practices, rules and technologies (and ensuing logic of appropriateness) that pertain in the domain, giving it stability and guiding decision-making. The second level is that of *niches*; places in which novelties are created and tested. Such novelties include new technologies, new rules and legislation, new organisations, new ideas and such. 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 influences directly the regime level as well as the niches by defining the room and direction for change.



**Figure 2. Multi-level representation of a system** (Based on Geels and Kemp, 2000; Van der Brugge et al, 2004)

Complex social systems are adaptive, which implies that the system as a whole adapts to its environment. But complex systems are co-evolutionary by nature as well; the dynamics at a particular systems-level are resulting from interaction between developments at lower systems'-levels. Complex systems, societal or other, thus change because of internal (often small-scale) changes out of which patterns emerge or because of external changes in the environment (landscape). This co-evolutionary, adaptive characteristic gives the system the property to self-organize (Rotmans 2004). Self-organization in the most pure sense of the word means the emergence of order without external control (Nicolis, 1989). Self-organization in a societal system refers to the whole of activities influencing the systems dynamics. In complex adaptive societal systems there is no external control over the system. Moreover, it can be argued that every directed action of any kind by any agent can be considered as 'managing' some (sub) part of the system. Management is than inherently part of the system and can even be regarded as a complex system itself (Kickert, 1990, Kemp and Loorbach, 2003).

Transitions are thus co-evolutionary by nature; they result from interacting developments in different societal domains (horizontal co-evolution), for example the interaction between technologies, regulation and behaviour. But using the multi-level model, we can also distinguish co-evolutionary dynamics between the different levels (vertical co-evolution). The defining system dynamic that 'causes' a transition is called modulation. This is when the processes at the different levels start to coincide and reinforce each other. Metaphorically spoken: a transition takes off when the slow beat of the landscape, the medium tempo of the regime and the quick pace of the micro level form one rhythm.

Thinking about societal development in terms of transitions implies a link with the subject of sustainable development. Many societal systems in Western Europe (agricultural, health care, energy-supply, mobility...) have been developed to address problems formulated decades ago and have since then only marginally been adapted. The call for sustainable development in this perspective is a plea to structurally transform these systems. Arguably, an extra effort is needed to achieve such non-linear change. The concept of transition management can accordingly be considered as a new form of governance that is aimed at influencing and coordinating the complex societal dynamics in the direction of sustainability or at creating opportunities for a transition to occur.

### **Transition governance: order and chaos**

Governing societal change in a desired direction has been the focus of political scientists as well as management scholars for decades. There seems to be an increasing consensus amongst scholars about the impossibilities of bringing about such change either individually, through authoritarian approaches or through liberalized market-approaches. These impossibilities are explained both from the perspective of failing government and the need for new governance arrangements (by authors such as Scharpf, Hooghe, Teisman), as well as from the increased (societal) complexity and the unstructured and complex nature of the policy process (e.g. Hisschemöller, Sabatier, Lindblom).

The concept of transition management is rooted in fields as multi-level governance and adaptive management (Kemp and Loorbach, 2003). Transition management aims at the development of a portfolio of management strategies to influence different types of developments. At the micro-level it aims at influencing the variation and selection process through creating room for self-organization, experimentation, learning and knowledge co-production. At the macro-level, transition management aims at redefining leading visions, ambitions and goals within the context of a constantly changing society. At the meso-level, transition management targets existing institutions, regimes and structures in order to 'open them up' or tries to develop new, competing ones.

The complex systems perspective supports the idea that policy-making processes take place at different conceptual as well as spatial levels. At every level, different processes with different dynamics and different sort of output take place (visions, strategies, agenda's, projects). Transition management tries to align these processes through a combination of network-governance and self-steering. As such, transition management can be considered as a form of multi-level governance (Scharpf, 1999; Hooghe and Marks, 2001) whereby state- and non state-actors are brought together to co-produce and co-ordinate policies in an iterative and evolutionary manner on different policy levels.

This evolutionary, iterative perspective builds upon the ideas of advocacy coalitions (Sabatier, 1999) and partisan mutual adjustment (Lindblom, 1993) as drivers for social change. Different groups with different belief, stakes and ambitions try to put their issues on the (political) agenda and thus protect or further their interests. Through these processes of negotiation, adaptation, co-production and sometimes dispute, actors change or adapt their views, redefine their own place and role in the system and are able to rephrase the problems perceived. These processes take place at each level, creating competition between visions, agenda's and actions and between, institutions, networks, companies and individuals.

Such an evolutionary, almost 'survival of the fittest' paradigm breaks with the tradition of a more reductionist approach in analysing social change and societal problems (Midgley, 2000). In this approach, perceived problem can be solved with straightforward solutions. Goals are givens as are the solutions and governing the society is the responsibility of the government solely. This reductionist tradition has led to the establishment of numerous institutions and structures that favour a linear, problem-solving approach for example because of their focus on implementation and execution. Since these institutions tend to conserve themselves and are very difficult to change, the transition-to-transition management could be the most demanding of them all.

Although transitions are partly autonomous processes, they are simultaneously partly manageable, at least with regard to its speed and direction (Rotmans, 2000; Loorbach 2002). Based on the characteristics of complex systems, transition-management is an evolutionary and adaptive governance-concept based on the following principles:

- **Systems' thinking and integral policy**

The diversity of agents in any societal system means that there are different perspectives problems and solutions (bounded rationalities). There is need of a framework in which different perspectives are made explicit and are integrated: an

- integrated system analysis in which components and relations between them are made explicitly.
- **Long-term envisioning as a framework for short-term action**  
In order to understand and foresee thresholds in the system that may be exceeded, an integrated system approach is required and long term developments and strategies have to be analyzed. In addition, outside attractors (e.g. visions of alternative states) can enhance and focus innovation dynamics.
  - **Multi-actor network-steering and coalition forming**  
There is no single actor that has the managing capabilities to fully control the process. Many actors are involved and every actor is 'managing', e.g. every actor influences at least some part of the system. There are however differences in power. This requires network steering.
  - **Keeping options open**  
There is a high level of uncertainty about the future variation and selection of innovations and the way the systems' dynamic will unfold. This means that there are different assessments possible. Therefore we have to experiment and learn about the pros and cons of innovations and not be too quick with decisions (see also Arthur)
  - **Multi-level organization**  
In the system there are different levels of organization. This means that there are different dynamics present at different levels. This requires different strategies. At each level, specific types of actors participate, specific (policy) instruments are used and different competencies are needed. Each level should work towards the same goal, however, this means that at each level different dynamics have to be created, but in such a way they reinforce the others (modulate).
  - **Nucleus-management**  
The regime limits the horizon of solutions due to the historical grown organizations that introduce barriers for implementation. Solutions from the regime are therefore often limited to efficiency measures. Agents outside the regime have much to gain and not much to lose, and often have different perspectives and thus solutions than regime actors. In addition, there are delays between implementing measures and the effects. The political system is based on short-term cycles and popularity. Often innovations are not able to break through. Stimulation of individual ideas or technologies and coordination of innovation activities around them helps innovation nuclei to grow into antipoetic niches
  - **Focus on learning and knowledge transfer**  
Sustainability is about finding balances and adapting to changing dynamics. Core characteristic of sustainable systems is the adaptivity. Through structured organization of learning processes, knowledge transfer and experimentation, the adaptive capacities of society can be enhanced.

### **The Multi-Level Governance perspective**

Analogous to the multi-level model of transitions, the multi-level framework for transition management distinguishes between three levels: the strategic, the tactical and the operational level. These levels correspond with the landscape, regime, niche typology of Geels and Kemp (2002) but are based on activities carried out by actors:

- **Strategic level:** processes of vision development, strategic discussions, long term goal formulation
- **Tactical level:** processes of agenda-building, negotiating, networking, coalition building
- **Operational level:** processes of experimenting, project-building, implementation

At each level, specific types of actors participate, specific (policy) instruments are used and different competencies are needed. Taking an actors' perspective, transitions are the outcome of the interactions between actors on one level and interactions between levels. Actor strategies inform short-term activities, and competing companies for example will follow similar trajectories. Innovation within this context is multi-level innovation ranging from product-innovation to organizational and system innovation. Transitions as societal innovation only comes about when the innovation processes at different levels interact and reinforce each other.

A good example of how such societal innovation takes place is the transition in Dutch waste-management (Loorbach, 2003b). Long term planning (through national environmental plans) and envisioning or the formulation of ambitions<sup>6</sup> triggered activities at the lower system levels; the development of new technologies and practices, new rules and regulations for these technologies and practices. In turn, the new way of dealing with waste (recycling and waste-separation, new treatment possibilities) influenced the long-term images and ambitions. In other words, in transitions new systemic patterns emerge out of the seemingly chaotic and spontaneous processes and different system-levels.

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

**Table 1. Multi-level, multi-phase framework of transition management**

Transition management is by definition multi-actor process as the degree of complexity of transitions is too high to be managed in terms of command and control by one actor (Loorbach & Rotmans, 2004). Transitions are the result of many causes, not a singular cause, so there is no single actor that has the managing capabilities to fully control the process. Moreover, since many actors are involved as stakeholders there are different viewpoints, agendas and stakes relevant. In this perspective every actor is 'managing' or influencing at least some part of the system. Of

<sup>6</sup> the best example was the so-called Ladder of Lansink', an hierarchy of waste treatment possibilities ranging from landfilling and incineration to recycling, re-use and prevention



course there are differences in power, instruments, roles and practices between actor-groups<sup>7</sup>, but in practice each actor-group has particular contributions to make in each phase of transition. In other words, while transitions defy traditional planning, they are (and thus can be) influenced and adjusted in terms of the direction and pace of transitions (Loorbach & Rotmans, 2004). Analysis from this point of view is investigating what types of actors are important and what are suitable strategies that influence a transition.

Based on this approach, we can further develop the rough framework (Table 1) linking the building blocks from complex systems thinking, governance and policy theories and the concepts of transition and transition management. The activities of transition management are aimed at influencing, organizing and coordinating processes at the different (strategic, tactical, operational) level so that these processes align and reinforce each other. In effect transition management thus comes down to dealing with a multiplicity of steering activities by different actors and pointing the activities in a shared and desired direction. To this end, different transition management instruments are used at different levels (transition arena, transition agenda, 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 is or gets involved while the transition becomes more practical, while at the strategic level, only a relatively small number of actors will be involved.

By linking the transitions concepts, notions from complex systems (nested systems, emergence, co-evolution, self-organization etc.) with different building blocks from governance studies (the incremental approach, the advocacy coalition framework, the multi-level governance concept) we have developed a rough framework for structuring transition management activities. At the strategic (systems') level most important is giving direction to developments by developing leadership capacity, long-term orientation and integrated strategies. This is by definition not a democratic process (Lindblom and Woodhouse, 1993), and should therefore be carried out by strategic actors in the transition-arena, which is explicitly linked up to societal strategic networks. At the tactical level, the transition agenda is the main instrument, allowing for negotiation processes and broader stakeholder involvement through network governance. On a thematic or subsystems level, different strategies can be developed in coalitions, networks, firms etc. At the operational level, implementation and execution of transition experiments is the main focus, stimulating innovator and entrepreneurs to come up with innovations and alternatives. At this level, even top-down regulation of directives could suffice.

### **An operational transition management model**

In practice, transition management has to result in the organization of sustainable innovation and the constant transfer of knowledge. In the Netherlands, the model of the transition-arena (Loorbach, 2002, Dirven et al. 2002, Loorbach and Rotmans, 2004) is being developed as a steering model to organize transition management activities. The transition-arena is best viewed as a virtual arena or network, which provides room for long-term reflection and prolonged experimentation. Such a transition arena has to be supported by political or

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<sup>7</sup> We distinguish between governmental organisations, companies, knowledge institutes, NGO's and intermediary organisations

regime-powers, but not dictated by it, for example through the support of a minister, director etc.

Within such a transition-arena, each actor has to redefine their own role, their competences and their *modus operandi* in interaction and co-production with the other actors. Through such a process of co-production and co-ordination, actors at different levels will be able to formulate joint goals and develop common strategies that involve societal uncertainties, power-relations, institutional barriers as well as ambitions, targets and desires. This way, a new structure of collective governance emerges whereby government is at the same time facilitator and one of the players. Because of the evolutionary nature of transitions, such an adaptive multi-level approach, whereby uncertainties and risk are acknowledged and dealt with, is better fit to develop policies on complex and structural societal problems. A model that is currently used in the Netherlands to implement transition management consists of 4 activity-clusters (Loorbach, 2002, Loorbach and Rotmans, 2004):

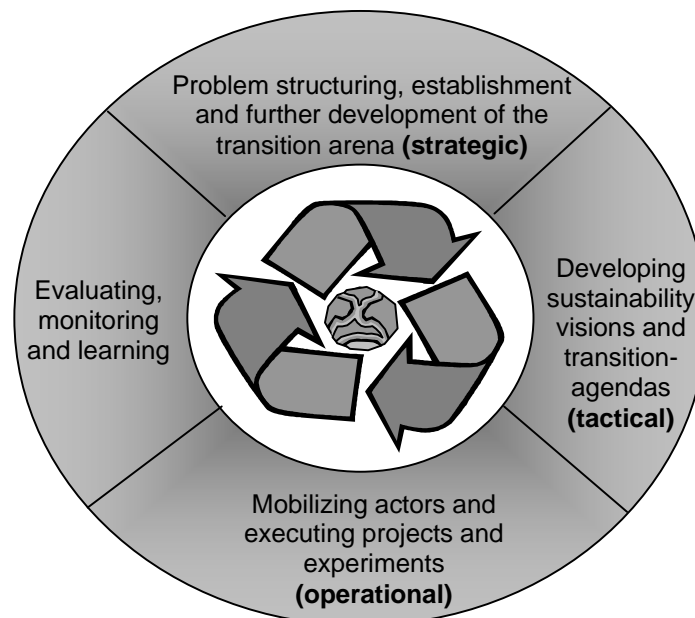


Figure 3: Activity clusters in transition management

*Problem assessment and establishment and organisation of a transition-arena*<sup>8</sup>

An integrated system analysis should be the basis of every transition management process<sup>9</sup>. Informed insight into the complexity of the system, its major defining subsystems, the dominant causal relations and loops and the roots and nature of structural problems should provide a starting point as well as future conditions for discussing visions, strategies and actions. The establishment and organisation of a transition-arena is closely related to the problem analysis. A preliminary assessment will yield knowledge about the main actors

<sup>8</sup> more extensive description of the activities in transition management can be found in Loorbach, 2002, Rotmans, 2003, Kemp and Loorbach, 2003, Loorbach and Rotmans 2004)

<sup>9</sup> we choose the term 'assessment' as opposed to problem-solving. Problem assessment is similar to the idea of problem-structuring (Hisschemoller and Hoppe, 2001), but based on a systems-perspective.

influencing the system in both a constructive and a conservative way, which informs selection of participants for the transition arena.

This selection is of vital importance; the participants need to reflect the complexity of the transition at hand but also have to provide different necessary knowledge-elements. Participants need to have some basic competencies at their disposal: they need to be visionaries, forerunners, able to look beyond their own domain or working area and be open-minded. They must function quite autonomously within their organisation but also have the ability to convey the developed vision(s) and develop it within their organisation. As the process progresses, the transition arena will expand slowly, involving new actors while at the same time some participants will leave the transition arena.

*The development of sustainability visions and a transition agenda*

Long-term visions<sup>10</sup> of sustainability can function as a guide for formulating programmes and policies and setting short-term and long-term objectives. These visions must be appealing and imaginative so as to be supported by a broad range of actors. Inspiring final visions are useful for mobilising social actors, although they should also be realistic about innovation levels within the functional subsystem in question. Last but not least they require agreement among often diverging opinions on what sustainability means for a specific transition theme. Many sustainability visions are still imposed by the government upon other parties in a top-down matter or originate from a select group of experts who are far from representative of the broad social setting. The inspiring, imaginative and innovative transition visions are represented by transition images; integral descriptions of (sub) systems, which evolve over time and depend on new insights and learning effects. The transition images embrace transition goals, which are qualitative rather than quantitative, multi-dimensional, and should not be defined in a narrowly technological sense, but should represent the three dimensions of sustainability: economic, ecological and socio-cultural.

Various transition pathways lead to a particular transition image, and from various transition images a particular transition pathway may be derived. The transition images can be adjusted as a result of what has been learned by the players in the various transition experiments. The participatory transition process is thus a goal-seeking process, where the transition visions and images, as well as the underlying goals change over time. This differs from so-called 'blueprint' thinking, which operates from a fixed notion of final goals and corresponding visions.

Based on a process of variation and selection, new visions and images emerge, others die out and existing ones will be adjusted. Only during the course of the transition process will the most innovative, promising and feasible transition visions and images be chosen. This evolutionary goal-seeking process means a radical break with current practice in environmental policy where quantitative standards are set on the basis of studies of social risk, and adjusted for political expediency. Risk-based target setting is doomed to fail when

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<sup>10</sup> here, we link vision to 'system'; a vision is a set of characteristics that define the desired future state or condition of the system at hand. For example: a vision for a future energy-supply could be 'clean, efficient, reliable and affordable...' energy-supply, a vision for a sustainable agriculture could be: eco-friendly, animal-friendly, local production and consumption

many issues are at stake and when the associated risks cannot easily be expressed in fixed, purely quantitative objectives.

In each case, interim objectives are used. However, in transition management these are derived from the long-term objectives (through ‘back-casting’<sup>11</sup>), and contain qualitative as well as semi-quantitative goals and measures. In other words, the interim transition objectives contain *content* objectives (which at the start can look like the current policy objectives, but later will look increasingly different), *process* objectives (speed and quality of the transition process) and *learning* objectives (what has been learned from the experiments, what is blocking progress, identification of things that we want to know). These objectives, alongside agreements on different roles and instruments used, are combined into the transition agenda.

An adequate transition-agenda can form a binding element in the transition process. The transition-agenda requires a balance between structure and flexibility. Structure is needed to position the scale levels in 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, Rotmans and Verkaik, 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.

#### *The initiation and execution of transition-experiments*

From the transition visions and images, transition-experiments are derived which are either related to or combined with existing activities. The transition-experiments are supposed to contribute to the sustainability goals at the system 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.

#### *Monitoring and evaluating the transition process*

Continuous monitoring is a vital part of the search and learning process of transitions. We distinguish between two different processes to be monitored: the monitoring of the transition processes itself and the monitoring of transition management. Monitoring the transition process itself has to take place at different levels in terms of monitoring the slowly changing macro-developments, the sharply fluctuating niche-developments as well as the individual

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<sup>11</sup> an approach developed within the DTO-KOV programme ([www.dto-kov.nl](http://www.dto-kov.nl)) and the COOL project

and collective actors at the regime level. This provides the 'enriched context' for transition management. The monitoring of transition management requires a different form of monitoring. First the actors within the transition arena must be monitored with regard to their behaviour, networking activities, alliance forming and responsibilities and also to their activities, projects and instruments. Next, the transition agenda must be monitored with regards to the actions, goals, projects and instruments that have been agreed upon. Finally the transition process itself must be monitored with regards to the rate of progress, the barriers and points to be improved, etc.

### **Transition management in action: energy transition policies in the Netherlands<sup>12</sup>**

The Dutch government uses the model of transition management to manage four transitions: the transitions to sustainable energy, sustainable mobility, sustainable agriculture, and the biodiversity and natural resource transition. This section will describe how the abstract concept of transition management is translated into policy in the energy area. The Ministry responsible for this transition is the Ministry of Economic Affairs (responsible for industry and energy). This ministry has been very active since 2001 in developing transition policies for the transition to a sustainable energy-supply system by 2050 (see: [www.energietransitie.nl](http://www.energietransitie.nl)). In 2001, the Ministry of Economic Affairs started consulting various stakeholders (companies, researchers, NGO's) to assess whether they saw possibilities for the transition, and if so, what these chances were. Based on these conversations and an intensive scenario-study (LTVE), they selected five 'robust elements' or subprojects in the transition to a sustainable energy-system, with a time-horizon of 2030:

- Biomass International
- New Gas Services
- Sustainable Industrial Production
- Toward a Sustainable Rijnmond (an industrial ecology project)
- Policy Renewal

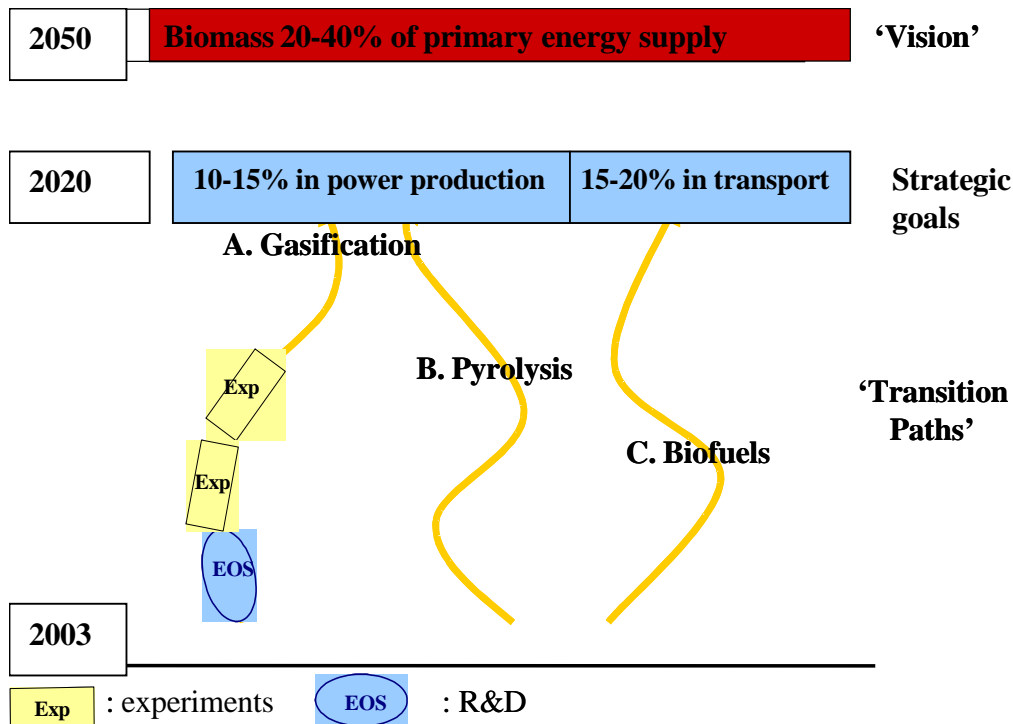
In 2002, the Ministry started the Project Implementation Transition management (PIT) that had to investigate whether the selected subprojects would meet enough support, enthusiasm and commitment from the relevant stakeholders to create a climate in which they would be willing and able to work together. The project was initially financed with 35 million euros and supported by an 8-person staff. Main conclusions from this phase were that the transition-approach proved to be appealing to the majority of the stakeholders and they would be willing to invest (time and money) and commit themselves to such a process under the condition that the transition management approach would be made more concrete, that more explicit visions for the future would be developed, and that the government would support the transition endeavor both financially as well as process-wise.

Based on these findings, the green light was given for the implementation of phase 2 in 2003. The objectives of this phase were **strategic**: to develop a long-term vision on energy in general and for each of the subprojects supported by all relevant actors, to have these actors committed to the process, to map possible paths, barriers and necessary preconditions for the transition, to set up plans for knowledge-development and –sharing and communication, to

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<sup>12</sup> This section is based on Kemp and Loorbach (2004a), see also Kemp and Loorbach (2004b)

chart international developments and finally to develop transition-experiments. For biomass this resulted in the following vision<sup>13</sup>, to be adapted with time:



### Box 1: The Dutch vision for biomass<sup>14</sup>

The ambitions for biomass that were agreed on consist of a share of 10-15% for biomass in power production and a share of 15-20% in transport in 2020. For 2050 there is an ambition of 20-40% biomass in primary energy supply. The goals are set by industry, NGO's, the Ministry and scientists who also formulated possible routes to these outcomes. The strategic goals for 2020 were called 'ambitions', something to aspire to. In its own communication the Ministry uses the following slide for the biomass route. 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. They will be adapted with time. A quintessential element of transition management is that no collective choice is made as to energy technologies and sources.

<sup>13</sup> What is referred to here is what we call an image under the over-all vision for energy. In taking the biomass-system as subject, the image becomes a vision on this level, opening up possibilities of formulating more concrete images and so on. From all scenario studies, it was concluded that 'Biomass' will play a significant role in any future energy-supply system. The form in which biomass will be used however is uncertain. Within the context of the overall vision for a sustainable energy-supply, different images have been developed (gassification, pyrolysis and biofuels), linked to different transitionpaths, which together must lead to the overall ambition.

<sup>14</sup> Source: [www.energietransitie.nl](http://www.energietransitie.nl)

After initial explorations at the strategic level, creating visions and formulating ambitions, the transition management activities spread to the **tactical** level. The three transition paths are composed of 30 technological and societal options that will be explored in the so-called transition coalitions; coalitions between technology-developers, companies, researchers, NGO's and government. One example of a coalition, which was developed by the industry itself in the context of this process, is the community on bioplastics (BCPN). Different actors developing different kinds of bioplastics (plastics based on biomass), ranging from flowerpots to plastic bags and pens, organized themselves into a branch organisation to develop a community, facilitate debate and provide a communication channel for the community toward government and society. Within three years, they have developed a logo, website, a strategic agenda and some successful examples. During this time, discussions of the organisation with the government have 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 was for a long time not possible 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, different conditions were slowly changed to enable the breakthrough of bioplastics on a larger scale.

Next to organising 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, where it was concluded that it was too technology-focussed (NOVEM, 2003). Another policy integration exercise was the evaluation of the government energy RTD (EOS) where 63 projects have been analysed on the basis of two criteria: knowledge position of the Netherlands and contribution to sustainable energy system. This led to the identification of "arrowpoint" 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.

Three other visible initiatives are: the establishment of a so-called "service point transitions" at the Ministry responsible for the Environment (VROM) which is also responsible for overall coordination of sustainability policy; a transitions newsletter; and the establishment of an "interview group" advising the Ministry about its energy transition policy. The interview group consists of societal experts of high repute which should make sure that policy is not exclusively supply oriented but also takes account of issues of acceptance and other societal concerns such as liveability. The group consists of mostly non-energy experts. Most of them had been involved in politics and several had held Ministerial positions.

Following these developments, in 2004 35 million euro was made available for strategic experiments at the **operational** level. In the project "Policy Renewal" the Ministry is

reconsidering its instruments and interactions with society. They are opting for a more participatory and interactive type of governance. An example of this is the establishment on January 21st 2004 of an “interview group for the energy transition”, an independent think tank composed mostly of non-energy experts and independent people. Next to the initiatives brought in by participants and the ones induced by the process, the ministry introduced two new instruments of transition management are the “Regeling Ondersteuning Transitie Coalities (OTC) for transition experiment coalitions and the “Unieke Kansen Regeling” of 35 million euro for transition experiments. For transition experiment coalitions 1.5 million euro is available. This is for feasibility studies with a maximum support of 50,000 euro. Both instruments are on top of the 173 million euro for energy innovation. It is hard to tell how much money overall is involved in transition management projects. In 2003 the Dutch government allocated 226 million euro for project on sustainable system innovation, half of which were related to sustainable energy. By way of comparison, the Carbon Trust in the UK being the main instrument for the transition to a low-carbon energy system has committed £29.9 million (45 million euro) to the discovery and development of low carbon technologies and businesses.

Different Ministries are now using the model of transition management and applying it in their own way. It is too early to evaluate outcomes, but what already seems apparent is that the approach leads to integration of activities across the spectrum. The first successes, in terms of agreements, projects, subsidies, inspiring images etc, serve as a flywheel and attract an increasing number of actors to the process. However, especially organizing the process within the context of the existing institutional frameworks has proven to be difficult because of the tension between the existing interests and institutionalized routines and the innovation promoted by the transition network. Through engaging into transition management activities, the barriers to innovation become clear and conflicting interests are identified. This leads to tensions, negative feedback, irritation and sometimes conflict, but these are necessary to achieve the intended changes. The exploitation of win-win options does not get you far. So far also little progress has been made in involving citizens in the transition process in a direct way. The goals of 20-40% biomass for example have been chosen by business. The selected transition goals of reliability, costs efficiency and CO<sub>2</sub>-low were chosen by the government.

## **Conclusions**

The complexity of our society is continuously increasing because of specialisation, functional differentiation and the development of networks. The organization of societal systems has become maladapted to the changing outside conditions leading to persistent problems and a lack of sustainable development. Societal systems as a whole, including the organization of public management, are not able to change their own systems structure consciously and break through path-dependencies. In order to change the unsustainable structures of the system we need management principles based on the dynamics and behaviour of complex systems.

The presented concept of transition management has been derived from the complex systems approach and governance. These management principles have been translated into an operational model. This management concept is both prescriptive and normative in the sense that it can be used to analyse as well as to structure transitions and transition management. Only recently the integrated strategies based on transition management are being developed,



and an assessment of the effectivity of the approach is difficult. However, the approach theoretically addresses some of the major problems in current policy making, especially with regard to long-term sustainable development. Besides, it seems to sit very well with the latest debates on governance, policy making and complexity. The operational model as presented here has been applied in a number of situations.

The transition management approach is used in the Netherlands 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 is 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.

The Dutch transition approach is innovation-oriented and bottom-up with long-term visions guiding societal experiments. Various paths are explored simultaneously to avoid lock in adherence to certain paths. This makes sense given the uncertainty about what option is best. In doing so Dutch authorities rely on the wisdom of variation and selection processes rather than the 'intelligence' of planning. A mechanism of self-correction based on policy learning and social learning is part of transition management. It offers a framework for policy integration, helping different Ministries to collaborate. Whereas other countries are engaged in managing transitions in an implicit way, the Netherlands does so in an explicit way. The commitment to transitions allows for cooperation between Ministries but also to make 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 politics.

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