A Transition Research Perspective on Governance for Sustainability

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In this chapter we present the transitions approach as an integrated perspective to understand and possibly orient our society towards sustainable development. Since the concept of sustainability is inherently normative, subjective and ambiguous, we argue that (unlike some more traditional approaches to sustainable development) we should focus on an open facilitation and stimulation of social processes towards sustainability. The transitions approach and transition management specifically, seek to deal with ongoing changes in society in an evolutionary manner so as to influence these ongoing changes in terms of speed and direction: towards sustainability. A transitions approach to explore sustainability transitions poses novel challenges for research: there are no unequivocal answers, nor it is clear how these processes should be governed. We conclude our analysis by formulating the basic research questions central to the search for governance for sustainability, and by reflecting on the role of science in sustainability transitions.

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1 Introduction

Over the last decade, sustainable development has become a central concept guiding scientific debates and policies related to complex and persistent problems (Jansen 2003; Meadowcroft 2000; Scott and Gough 2004). Sustainable development aims to ensure economic welfare, social equality and ecologic quality across society, generations and into the future. It is commonly associated with those types of social problems that demand a fundamental restructuring of dominant paradigms, institutions and practices. In such a context, conventional forms of planning and policy as well as traditional conceptions of knowledge and of the role of scientists are being challenged (Flyvbjerg 2001; Kates et al. 2001). Over the last decade, new research and policy fields have emerged adopting more integrated perspectives and concepts, such as transition and resilience approaches that are explicitly based on complexity and uncertainty.

In the transition perspective, our society is composed of complex adaptive systems in which individuals and organizations (may) self-organize within the limits set by physical, institutional and informal structures, and (can) experience the emergence of innovations of different types (e.g. technological innovations or social innovations in the form of new practices and/or routines). Historical transitions such as energy supply or mobility transitions were semi-autonomous societal processes; since the vast majority was not steered in a collective way but emerged as a societal outcome. Transitions can take decades to materialize and are highly uncertain in terms of future development, possibilities for change and the level of intervention possible in such dynamic processes. Though it is clear that ongoing processes of change need to be oriented towards more sustainable system's states, the often blurred vision of what exactly is sustainable makes the pathways towards a sustainable system state highly uncertain.

For facing the challenge of sustainability, not only the translation of sustainability in a specific context needs to be coordinated and to comply with the sustainability values, but also the actors involved need to re-evaluate their roles and practices. We argue in this chapter that the transitions approach can aid our understanding of sustainability transitions as well as our drawing of governance guidelines[1] that encounter the multi-faceted nature of sustainability and the complex nature of societal transitions.

[1]We perceive governance as a meta-level pattern of societal interactions (intended and unintended) or as Kooiman (1993, p. 2) notes, governance to be interactive as "the pattern that emerges from the governing activities of social, political and administrative actors" that "focuses on the interactions taking place between governing actors within social-political situations." (Kooiman 2003, p. 7).

In our effort to present what the transitions approach can offer to sustainable development research, we will first elaborate on existing propositions of sustainability and sustainable development (Sect. 2). In our analysis of sustainability research and the different research streams and approaches that are risen by sustainability research, we will present (how and) that the transitions approach also relates to sustainability research (Sect. 3). The transitions' approach takes into account the intrinsic characteristics of the societal system (e.g. the complexity, the interdependence of system components, and the presence of multiple actors and networks) and perceives fundamental changes in culture, structures and practices as an answer to persistent problems (Frantzeskaki and De Haan 2009). Based on the transitions approach, we will draw governance guidelines for sustainability transitions that also relate to and give rise to research propositions for governance of transitions (Sect. 4). In addition to this, the role of science and scientists for sustainability transitions will be discussed and a reflection on the new roles of scientists will be given (Sect. 5). Concluding remarks regarding the analysis will be presented at the end (Sect. 6).

2 Sustainability and Sustainable Development: Existing Propositions

Since the late 1980s, many countries have committed themselves to sustainable development and are struggling with how to achieve it. Following the Brundtland report *Our Common Future* (WCED 1987), sustainable development came to be defined as redirection of social development in ways that combine prosperity, environmental protection and social cohesion. In the Brundtland report, sustainable development was defined as a development that meets the needs of the present generation, without compromising the needs of future generations (WCED 1987). This definition is normative since future generations should have the same possibilities, subjective since it requires an assessment of what these future needs are, and ambiguous since these future needs are determined by cultural, ecological and economic developments that can be defined in more than one way (Martens and Rotmans 2002; UN 1997).

At the international level, there is a consensus on the need for sustainable development and key areas in which the next decade significant progress needs to be made: poverty, hunger, health, education, life expectancy, environmental sustainability and global partnerships (UN 2005). The approach to sustainable development adopted by the United Nations 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 achieving sustainable development. A lot of countries opted for sustainability councils and the development of sustainability indicators (see Mulder 2006, pp. 148–165). 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.

We can derive some basic characteristics that are attributed to the concept of sustainable development that are visited in almost all definitions and scientific writings. The first is that sustainability is intergenerational. This means that a long-time horizon, at least one or two generations (25–50 years), has to be considered. The second characteristic is the importance of scale. Sustainability can be achieved at different levels. Pursuing sustainability at one level does not necessarily scale-up or scale-down to different levels. Hence, local or regional sustainability does not necessarily mean national or global sustainability and vice versa. Consequently, sustainability analysis requires a multitude of scale levels. The third common characteristic is that sustainability relates to multiple domains. Sustainability encompasses a certain context-specific balance between ecological, economic and socio-cultural values and stakes (Kates et al. 2001; Pezzoli 1997). In addition to this, sustainability values can form and be adopted by different sectors such as energy, food or water.

Sustainable development is therefore a normative orientation that provides a frame of reference to discuss and direct differences in perception, ambition and understanding between actors in light of desired changes in society. After the initial optimism during the 1990's about win-win opportunities, it is increasingly understood that there are tradeoffs between different values and interests in any type of development (at least in the short term) and that each development tosses up new problems for society. Considering the presence and impact of the aforementioned impacts and trade-offs, it is argued that alternatives for development can only be called sustainable when they are (co-)developed, implemented and formulated by societal actors (Clark 2003).

Following this, we suggest that sustainable development should be considered as a continuous process in which societal values and interests are represented, negotiated and balanced. At the same time, new alternatives and visions need to be explored and experimented with. Sustainable development is a multi-dimensional, dynamic and plural concept that neither can be translated into the narrow terms of static optimization nor is conducive to strategies based on direct control. This is a distinctive characteristic of sustainable development as a new type of development process vis-à-vis economic development: the goal of sustainability exists but its target level changes over time due to its redefinition by every generation (Mulder 2006, p. 74). As Meadowcroft (1997, p. 37) 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 their understanding of the requirements of social justice is".

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 actions. This means that the challenge of sustainable development can be formulated as a continuous governance process that enables

representation of various perspectives, values and interest and creates space for experimentation, innovation and learning.

3 Transitions Approach for Sustainability

The focus of the current analysis is on *sustainability transitions* or transitions to sustainability that concern continuous processes of change that reorient and restructure a societal system towards a sustainable system state that satisfies sustainability values. In line with this and as already indicated in the introduction, adopting a view on the transition to sustainability implies an integrative view of sustainability, which is capable of incorporating multiple domains, multiple levels of scale and spans a long-term (being intergenerational).

3.1 Foundations of Transitions Approach

In the early 1990s complex systems theory was introduced, focusing on the co-evolutionary development of systems. The establishment of the Santa Fé institute in New Mexico in the United States in 1984 functioned as incubator for a new research movement, which laid the basis for complex adaptive systems theory (Holland 1995; Kauffman 1995). Although the theory is far from mature, it has attracted a great deal of attention and has many applications in diverse research fields: in biology (Kauffman 1995), economics (Arthur et al. 1997), ecology (Gunderson and Holling 2002) and public administration (Teisman and Klijn 2008). The basic idea is that complex interactions between different elements can be understood in a systemic sense: through their interaction, elements within a system co-evolve with each-other and with their environment, new structures and novelties emerge and new configurations appear through self-organization.

The basic mechanisms that underlie change in complex adaptive systems are co-evolution, emergence and self-organization (Holland 1995). Societal systems can be considered as complex adaptive systems. Societal sectors consist of numerous interlinked elements (e.g. actors and institutions), there is a high degree of uncertainty about their interactions and feedback and they have an open and nested character in terms of different levels of organisation. From this perspective, typical complex system behaviour can be recognized, as for example emerging structures, co-evolving (policy) domains and self-organizing processes can be observed. One of the possible patterns distinguished is that of transition: a system in a relatively stable equilibrium is (suddenly) going into a phase of rapid change through a process in which self-organisation and co-evolution play an important role before a new equilibrium is found.

3.2 Transitions Perspective on Systems Innovation

History has witnessed numerous transitions in economy, agriculture, mobility, and energy, but also in areas such as education, health care, and social structure (Geels 2004; Rotmans et al. 2001). Transitions are processes of 'degradation' and 'breakdown' as well as of 'build up' and 'innovation' (Gunderson and Holling 2002) or of 'creative destruction' (Schumpeter 1934) of societal systems. The central assumption is that societal systems go through long periods of relative stability and optimization that are followed by relatively short periods of radical/fundamental change. These changes can be analyzed in terms of multi-level (distinguishing between dominant regimes, upcoming innovations/niches and landscape development (Geels 2004)) and multi-phase frameworks (in terms of predevelopment, take-off, acceleration and stabilization) (Rotmans 1994).

3.3 Transitions Perspective on Systems' Sustainability

Historically, transitions have been primarily driven by changes in social subsystems that initiated large-scale changes such as demographic growth, technological innovation or economic expansion. In a sense, these historical transitions (such as those part of the industrialization era, the post-war emergence of mobility, intensive agriculture or fossil energy systems), were also partly driven by the promise of solving societal problems such as poverty, inequality, education and so on. Such transitions however produced, in dealing with certain issues, their own problems in turn. While individuals might now have availability of cheap energy and mobility, it has co-produced for example pollution, resources' exploitation and congestion. In that sense, the transitions leading to our current modern society have had as side-effect the current environmental problems. The challenge in dealing with modern complex and persistent problems is to find new ways in dealing with them in a more anticipatory and exploratory manner.

While complex processes of change are occurring, we need to try to better understand their dynamics and try to influence their pace and direction. Combined with the basic notion that sustainability is ambiguous, uncertain and contested, this means that the only way to 'enable' sustainable development is through participatory processes in which sustainability is discussed, negotiated and explored in light of the major changes that are undoubtedly necessary.

A process-philosophy for achieving sustainable development may aid the development of concrete action and allow for plurality in actor's objectives and actions as well as for flexibility of processes and actions. An example of such a participatory tool is the transition arena (Loorbach and Rotmans 2010) that aims at achieving fundamental change in practices and visions by involving and facilitating frontrunners. Within the transition arena, frontrunners were facilitated to work collectively to transform social systems towards sustainability in the long-term,

as well as to compete over 'best' solutions and conflicting values on the short-term. The transition arena is a tool with its limitations. Based on the principle of small-group effectiveness, the transition arena as a participatory tool raises issues about democratic legitimacy, accountability and control (Shove and Walker 2007; Hendriks and Grin 2007). At the same time, the deliberate visioning process that takes place within the transition arena questions the legitimacy of the existing dominant institutions since they are not able to include uncertainty and/or to create the level of social innovation needed for transitions (Hendriks and Grin 2007).

Dominant (policy and research) approaches predominantly seek to improve existing systems, leading to gradual improvement. Opposing this, transitions' thinking suggests that a sustainable development process requires a fundamental shift of a societal system. Instead of incremental changes that aim at preserving existing functioning, transition thinking focuses on radical changes or "transformation of both (...) systems and social structures and practices" (after Meadowcroft 1997, p. 430). It is concluded that apart from a co-evolving target of sustainability that a society needs to form, transition guidelines[2] are essential in creating space for and enabling a societal transition to sustainability.

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 include the 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 formulating and directing the research process and the role of researchers. They therefore provide a valuable basis for conceptualizing 'transition research'. Transition management is an example of a research topic that by definition cannot be developed in a traditional, purely scientific sense. It is based on transitions approach, itself still a theory (or approach) in development, and presumes that an understanding of transitions can lead to other types of (policy) practices.

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 (Loorbach 2007). The research methodology is unfolding during the 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.

[2]Transition governance guidelines are process-oriented propositions that relate to the process design towards fundamental change or transformation. Transition governance guidelines are not concerned with the definition of targets, or goals but with the design or the framing of the actions that will take place over the course of a system transition.

3.4 Integrated Assessment, Post-normal Science and Sustainability Science

The transition concept is an Integrated Assessment concept. Integrated Assessment (IA) (Rotmans 1998) is defined as a scientific "meta-discipline" that integrates knowledge about a problem domain and makes it available for societal learning and decision making processes. It is a relatively recent 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, Integrated Assessment by definition is both interdisciplinary (integrating scientific disciplines) and transdisciplinary (integrating scientific and lay knowledge). Integrated Assessment has been used as a new assessment 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. Integrated Assessment 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. By definition, transitions cannot be understood from a single scientific discipline or societal perspective and thus require interdisciplinary tools and frameworks. Transitions approach and transition management have primarily been based on knowledge and insights from Integrated Assessment.

This consideration also relates to the concept of 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. A key notion in Integrated Assessment 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. Sustainable development in this context is, according to the field of Integrated Assessment, 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 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 (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 Integrated Assessment and transition research is that of Sustainability Science (Kates et al. 2001; Kasemir et al. 2003; Clark et al. 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 Integrated Assessment, 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 emphasizes the importance of the involvement of stakeholders in the knowledge development process. While Integrated Assessment 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.

The participatory nature of Sustainability Science 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 and Rijkens-Klomp 2002; Kasemir et al. 2003). The central issue in this field is that participation in practice is often unstructured and ad hoc. Consequently, methods and tools for both participatory policy making and participatory (integrated) research need to be developed and tested (Van de Kerkhof 2006). Although participatory methods (e.g. focus groups, consensus conferences, scenario exercises, simulation games) have a long history, they have been reinterpreted in the context of Integrated Assessment 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 Integrated Assessment and Sustainability Science is that the knowledge generated is not only relevant for the situation 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.

4 Governance for Sustainability Transitions

Sustainable development as a societal objective is a continuous intergenerational, multi-scale (global and local) and multi-domain process of seeking a balance between social, economic, ecological and cultural values. Following the premises underlying transition research, transitions themselves are, like the concept of sustainable development, inherently uncertain, complex and unstructured. They cannot be studied in a classical straightforward manner, nor can they be influenced through linear blueprint approaches. The role of transition research in understanding and shaping ongoing transitions therefore necessary has characteristics of social construction, a concept well known in technology studies (Bijker et al. 1987). Applied to societal complexity, social construction means collectively structuring, identifying and giving meaning to ongoing changes as transitions. Transition management builds upon this idea to organize collective anticipation of future dynamics and structuring activities related to this, such as envisioning (or vision building processes), scenario-building, experimenting and monitoring. Transition management thus seeks to 'construct' a narrative of the need and possibility of a sustainability transitions, that will only be achieved if actors in society themselves make it 'true'.

Societal contexts are always unique, hence transition management cannot offer blueprints about governance means that can be effective in all contexts. Transition management can offer basic governance guidelines that can be used depending on the context. In the following section we start from four basic propositions to illustrate the view of transition approach for sustainability and how transition management as a governance approach can aid the achievement of sustainability with transition governance guidelines. For every governance principle discussed above, a number of governance guidelines are presented that are resulted by the operationalization of the governance principle into guidelines in compliance with the transition management principles (Loorbach 2007). Given that the transition governance guidelines offer only a direction towards action and are neither "blueprints" nor "concrete prescriptions for action", issues that require further research for achieving sustainability transitions are linked to the four sustainability governance principles.

4.1 Transition Guidelines and Research Questions

Research on transition dynamics and transition management resulted in a number of starting transition governance guidelines that are related to the below presented propositions. Given the complexity of phenomena as societal transitions, the below listed process guidelines are not set in stone but can and will evolve due to scientific debate and practical implementation. This approach is fundamentally different from a (more) descriptive and analytical scientific approach that would primarily focus on understanding these processes and describing them. The questions formulated below are in line with this based upon recent theoretical debates and

empirical insights around transition management. An additional remark is that future research on sustainable development will require a focus on new modes of governance for promoting sustainability transitions.

Proposition 1: *Sustainability transitions are long-term processes of fundamental change that incorporate processes of societal, ecological, economic, cultural and technological evolution*

Transition governance guidelines:

(a) *Explore and understand the dynamics of the system so as to create 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 intervention.

(b) *Enable learning-by-doing and doing-by-learning*. Social learning is a pivotal aspect of societal transition processes, aimed at 'reframing', changing the perspective of actors involved. Social learning as the combined outcome of learning-by-doing and doing-by-learning actions stimulates the development of visions, pathways and experiments that form a new context as well as pave the ground for the reorientation of the societal system.

Research questions:

– Which are the prevailing patterns of societal transitions in the form of multi-domain processes of change?
– Can we distinguish different types of transitions related to sustainability issues and what does that mean in terms of societal dynamics?
– Is it possible to understand ongoing transitions in which we all are part and if so, are we able to influence these?

Proposition 2: *Enabling societal processes of change (transitions) implies an integrated understanding of the dynamics of change and deliberate and reflexive strategies so as to allow for self-orientation of society towards a sustainable development pathway*

Transition governance guidelines:

(a) *Enable radical change in incremental steps*. Radical, structural change is needed to erode the existing structure of a system and ultimately dismantle it. Immediate radical change, however, would lead to maximal resistance from the deep structure, that cannot adjust to a too fast, radical change. Abrupt forcing of the system would disrupt the system and would create a backlash in the system because of its resilience. Incremental change allows the system to adjust to the new circumstances and to build up new structures that align to the new configuration.

(b) *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.

Research questions:

- How can we better understand complex evolutions in society to make better use of complex system dynamics?
- Which are the means for governance that can deliberately promote societal transitions while allowing self-organization and self-orientation of the societal system?

Proposition 3: *Innovation and sustainable development are interlinked*

Transition governance guidelines:

(a) *Create space for niches in transition arenas and transition experiments*. A niche is a new structure, a small core of agents that emerges within the system and is seen as the incumbent for innovation. An emergent structure is formed around niches to stimulate the further development of these niches into (policy) regimes.

(b) *Focus on frontrunners*. In this context we define frontrunners as agents with peculiar competencies and qualities: creative minds, strategists and visionaries. Frontrunners are able to accelerate and/or to initiate the dissipation of structures in complex systems and are active at different levels and domains.

(c) *Guided variation and selection*. Diversity is required to avoid rigidity within the system. Rigidity here means reduced diversity due to selection mechanisms which means that the system cannot respond flexibly to changes in its environment. Rather than selecting innovative options in a too early stage options are kept open in order to learn about the pros and cons of available options before making a selection. Collective choices are made "along the way" on the basis of learning experiences at different levels.

Research questions:

- Which modes of governance can promote innovation while securing sustainability values in multiple domains?
- Which are means for governance that can create space for innovation that complies with sustainability values apart from regulation and institutionalization of innovation systems?
- Which are means for governance that can anticipate multiple visions and values of sustainability while facilitating the adoption of innovation?

Proposition 4: *Sustainability transition is a continuous open-ended process of societal innovation. Governance for sustainability transitions has thus to secure sustainability values such as long-term orientation and intergenerational justice*

Transition governance guidelines:

(a) *Long-term thinking as a framework for shaping short-term policy in the context of persistent societal problems*. 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.
(b) *Anticipation and adaptation*. Anticipating future trends and developments, taking account of weak signals and seeds of change acting as the harbingers of the future, is a key element of a pro-active, long-term strategy as transition management. This future orientation is accompanied by a strategy of adaptation, which means adjusting while the structure of the system is changing.

Research questions:

- How can governance deal with the tension between promoting continuous innovation while at the same time needing to ensure institutional performance?
- Which are the means for governance that incorporate long-term orientation and its uncertainties?
- Which are the means for governance that ensure reflexivity and adaptability in face of long-term processes of transitions to sustainability?

5 Role of Science in Transitions

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 (i.e. feeding back insights from practice into the theory) requires finding adequate ways of dealing with a diversity of participants, differing normative interests and ambitions, and a variety of sources of knowledge. Development of competences and skills that enable the researcher to fulfil the required roles linked to research ambitions through training and experience should thus also form an explicit part of a transition research process.

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. The research methodology is unfolding during the 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.

Our working recommendations for the research for sustainability transitions concern the role of scientists in transforming policies and practices towards sustainability. Our experience in interdisciplinary and inter-sectoral projects showed us that research for sustainability requires not only an action research perspective but also simple actions that can result in desirable changes towards sustainability. Driven by our lessons, we recommend the following four roles for scientists that want to have an active role in sustainability transitions:

- *Create interdisciplinary teams for research projects*: Interdisciplinary research teams appear effective in linking knowledge from different fields and in this way connecting sustainability to different practices and applications. It may seem trivial to recommend interdisciplinarity, we know however that not all research programs are conducted by interdisciplinary teams within the sustainability field. The advantages of an interdisciplinary research team that includes policy scientists or management scientists for example are that the research findings can be translated into operational actions and can be connected to existing practices. Such operational outputs may result in achieving sustainability and sustainability shifts.
- *Be a knowledge broker*: Scientists have to be knowledge brokers and cross the boundaries between fields and between science and the policy realm (Litfin 1994; Michaels 2009). Michaels (2009) proposes different strategies so as to realize knowledge brokerage for environmental policy that can also imply for sustainability research. The only adaptation that Michaels' (2009) strategies of engaging, collaborating, informing, consulting, matchmaking and capacity building have to undergo is to focus not on finding the problem owner but on finding a sustainability vision.
- *Put sustainability in action*: Sustainability should not be a content-free word in the political jargon. The role of scientists – especially those engaging in policy oriented research or policy advice – in this context should be to inform and aid in formulating policy actions for sustainability to be achieved by different sectoral policies. Sectoral integration of sustainability should be not only a task of administrative bodies from every sector but also a performance indicator of institutional coordination within the government.
- *Create paradigms or lifestyle icons of sustainability*: We suggest scientists to include other actors such as corporate actors, public policy actors and citizens to co-create a paradigm or a lifestyle icon for society to imitate. The trivial mottos of sustainability scientists of "endangering the future of our children" or "borrowing from our children" do not appeal to the citizens. On the contrary it creates strong feelings and anti-movements like the anti-climate change movement. Looking at lifestyle icons that drove societal change (such as the western lifestyle dream or the modern life icons), our suggestion is for scientists to

approach corporate actors and citizens and co-construct either a lifestyle icon or a paradigm that appeals to people that incorporates sustainability principles with values and icons. We believe that if scientists alone create a sustainability paradigm, there is a risk of constructing/formulating utopic images or simply, a utopia. Hence, creating paradigms with a team of actors this risk may be eliminated.

6 Reflection and Discussion

This paper sketched the outlines of the transitions approach on sustainability and the consequences that are drawn from this approach in terms of governance guidelines for sustainability transitions. The transitions approach and transition management focus on understanding and promoting societal processes, and thus, on integrating theoretical with empirical knowledge. We have argued that a process-based approach to sustainability and the integration with the transition perspective has implications for the role of research and knowledge: transitions are uncertain processes that cannot be predicted or fully analyzed. Hence, we argue that certain key patterns and dynamics can be understood and used to reflect upon the possibilities for accelerating and orienting these transitions.

The research needed in understanding and in dealing with transitions is of an inter- and trans-disciplinary nature. Consequently, the research questions formulated cannot be answered in a traditional way: the empirical object (transitions) is continuously on the move. Transition research poses a challenge to the scientific community at large: the complex sustainability problems require the involvement of scientists who step over the boundaries of their scientific disciplines so as to develop new insights, to transfer new knowledge and in general to become part of the collective societal search process we call sustainable development.

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