

# **Managing Complex Governance Systems**

Dynamics, Self-Organization and  
Coevolution in Public Investments

**Edited by Geert Teisman,  
Arwin van Buuren and  
Lasse Gerrits**

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# **Routledge Critical Studies in Public Management**

**EDITED BY STEPHEN OSBORNE**

The study and practice of public management has undergone profound changes across the world. Over the last quarter century, we have seen

- increasing criticism of public administration as the over-arching framework for the provision of public services,
- the rise (and critical appraisal) of the 'New Public Management' as an emergent paradigm for the provision of public services,
- the transformation of the 'public sector' into the cross-sectoral provision of public services, and
- the growth of the governance of inter-organizational relationships as an essential element in the provision of public services

In reality these trends have not so much replaced each other as elided or co-existed together – the public policy process has not gone away as a legitimate topic of study, intra-organizational management continues to be essential to the efficient provision of public services, whilst the governance of inter-organizational and inter-sectoral relationships is now essential to the effective provision of these services.

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# Preface

Perhaps it goes without saying that governance is a complex matter and that managing governance processes constitutes a real challenge. Along with others, we as Public Management researchers at the Erasmus University Rotterdam have acknowledged this for some time. Our network approaches are well known. Until very recently, however, we did not explicitly deal with the meaning and implications of the concept of complexity. Complexity was the label we used to describe the state of being for governance and its processes, without providing much explanatory power to the term. We therefore felt the need to increase our understanding of complexity.

We assume, based on ideas garnered from complexity theory and evolutionary approaches, that complexity in governance processes is generated by three different characteristics: non-linear dynamics, the self-organization capacities of the participants in processes and coevolution between sub-processes and subsystems. In this book, we explore these three characteristics, resulting in the notion of a compounded process system as the object of research and management.

The journey towards these findings was long and erratic, difficult and challenging, provocative and satisfactory, but above all the process was extremely instructive. We cherish the process of discovery and our attempts towards justification as well as the prolonged period of cooperation among all the authors of this book.

As editors, we wish to thank the authors for their contributions and their tremendous efforts in incorporating the critical remarks of the reviewers and editors into their contributions. We aimed to present a coherent monograph, and are glad that the authors were willing to accept this and responded in very stimulating ways to the interventions we made.

We would also like to thank our colleagues from the Department for the fruitful discussions on complexity theory and its applicability to the field of Public Administration. Thank you for your critical support.

We thank the anonymous reviewers of Routledge who accepted our proposal for this book with enthusiasm.

We want to thank the Dutch Knowledge Programs Habiforum on innovative land-use, Transumo on sustainable transport and Living with Water

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We have received essential feedback from Dr. Henk Wagenaar and Dr. Phil Haynes, two well-known public administration scientists who are as much interested in complexity theory as we are. Their thorough reviews of our book-in-development have been extremely helpful in improving upon our ideas. Their assistance has contributed immensely to the quality of this book. Christopher Pollitt also deserves our gratitude for writing a critical chapter. He expresses doubt in public administration about the applicability and added value of complexity theory approaches to governance processes, and provides us with an essential opportunity to respond to the critical remarks he makes in our concluding chapter.

We would also like to thank the participants of the panels on complexity at the 11th IRSPM conference (Potsdam, 2007) and the 3rd IPA conference (Essex, 2008) for their valuable feedback. The IRSPM panel has already resulted in a special issue on complexity theory in public management in *Public Management Review*, 10 (3), May 2008.

We appreciate the efforts of Amrit Kaur, who has corrected our text and improved our English. Our student-assistant Jitske Verkerk did a good job helping us with the format of the book, collecting the references and doing a couple of other terrible jobs.

Last but not least, we would like to thank Francesca Heslop, Terry Clague and Tom Sutton of Routledge for the way in which they have guided us through the three stages towards the publication of this book. Due to their unending inquisitiveness, this book is able to appear on time, a real achievement for our complex group of authors.

Rotterdam, summer 2008  
Geert Teisman, Arwin van Buuren and Lasse Gerrits

# 1 An Introduction to Understanding and Managing Complex Process Systems

*Geert R. Teisman, Lasse Gerrits,  
Arwin van Buuren*

## 1.1 A SURPRISE

It could have been a fairly straightforward infrastructure project. The Hamburg Port Authorities anticipated an increase in the draught of future ships. These ships extend deeper in the water and the Unterelbe River between Hamburg and the North Sea was deemed to be too shallow to receive such ships. Consequently, a plan was made to deepen the Unterelbe. The Unterelbe was deepened, and for a while everything seemed fine. However, two years after the deepening operation, the physical system responded with a dramatic change in the amount of sediment accumulation. The volume of sediment accumulating in the harbor doubled in 2001 and doubled again in the years following. Apart from the rising cost of dredging the harbor, the sediment accumulation also eliminated the very reason for the deepening, since it reduces the amount of depth available to ships.

What has happened here? There is clearly a link between the decision to deepen and the shifts in the physical system afterwards. Were decision-makers short-sighted? Was the research to gauge possible outcomes insufficient? Did opportunism prevail over sound decision-making? At first glance, the decision-makers could be blamed for making the wrong decision. However, this line of thinking does not take into account the capricious nature of the world that decision-makers find themselves in. If the world was static, decisions and policies would always be carried out according to plan. However, there is, of course, no such thing as a static world, and very often decision-makers will find themselves in situations that are surprisingly different from what they expected. Even the most well-intentioned decisions can turn out unfavourably in an ever-changing world. This book attempts to achieve a deeper understanding of the capricious dynamics of that world and the ways in which decision-makers respond to it. In other words, it attempts to understand the complexity of governance.

### 1.1.1 Governance: A Complex Matter

It has long been known that governance can result in substantially different outcomes from initial expectations. Implementation studies, beginning



with that conducted by Pressman and Wildavsky (1973), indicate that institutions, procedures and documents are helpful in ensuring stable and predictable outputs and outcomes. In order to understand this more fully, the multiple interactions between governance processes and their environments must be studied. Theories such as those on incrementalism, policy streams, policy networks and punctuated equilibriums speak volumes about the ongoing quest for theories that capture the dynamics of the many aspects of systems of governance.

This book attempts to understand those dynamics from an *evolutionary perspective on public administration*. Our starting point is the empirical observation that governance systems and networks are often in states of change which make them difficult to analyze, let alone manage. Stability of governance systems seems to be the exception rather than the rule. Furthermore, any changes that do take place are often capricious. Processes seem to unfold in unique and non-replicable ways, making it difficult to learn from successes and failures and to develop general theories.

This then begs the question of how to develop knowledge about such an elusive subject of research. An attempt is made here by starting from a complexity theory perspective, with the assumption that the interactions in governance networks are complex: the outcomes of interactions between parties do not only result from the intentions and actions of these two parties, but also from interferences from the context in which the interaction takes place and the emerging results of such interactions. This means that the output and outcome of the same interaction can differ in different places and at different times. A governance approach or organizational arrangement applied in two different contexts can result in very different outcomes.

The same holds true for steering and management: attempts to influence complex systems are always encountered by the local dynamics of self-organization and the influences of coevolving developments in other systems. These phenomena have to be analyzed in order to understand the dynamics and outcomes of governance so as to enable public managers to influence their complex environment in a deliberate and intelligent way.

Another focus of this book is the human actors who are confronted with complexity. As has been demonstrated many times (cf. March, 1994; Morçül, 2003; Gerrits, 2008), human actors—especially actors with ambitions to steer and coordinate—do not appreciate complexity and non-linearity. Complexity is regarded as a source of failure and as something that should be reduced or ‘fixed’. The literature is littered with practitioners who recount that their approach would have worked if only it had not been obstructed by, for instance, a stubborn politician, the lack of a budget or changing priorities within the organization. A theory will be proposed based on the assumption that complexity is here to stay and that it can be looked upon not necessarily as an enemy but possibly as a friend of progress and success that contributes to management theories

and practices. This book aims to contribute to a management theory and practice that fits in with the degree of complexity of the system to be managed. Existing management ideas on simplification—sticking to existing scope and goal definitions, control and demarcation of responsibilities—are confronted with ideas on scope-adjustment and goal-seeking, trust-building and dynamic boundary judgments.

## 1.2 EVOLUTIONARY INSIGHTS FROM OTHER SCIENCES

The approach in this book has been coined as an evolutionary approach because the authors are interested in the *development* of complex systems rather than in their characteristics in a certain place and time. To put it more concretely, they are more interested in decision-making and implementation within governance systems than in the institutional system as such. In contrast to many other studies, the focus here is not on the specific decisions and how they were prepared and executed. In a complex system a decision made by a single agent or actor is just an event in a world of many and diverse events. This perspective allows for a more thorough understanding of why (political) decision-making often leads to unintended, adverse and unwanted or no results.

The evolutionary approach is rooted in evolutionary biology (cf. Odum, 1971), but also appears in other domains, such as economics, psychology and sociology. It (therefore) has multiple applications and interpretations upon which this book builds in order to understand the shape and workings of systems of governance. Sanderson (1990) makes a distinction between evolutionist and evolutionary theories. This is functional in demarcating theories about long-term (societal) change in general and change as a result of mutual interaction and selection processes. Moreover, for a theory to have an evolutionary character, it should assume a directional tendency to change, whether by progression or regression, as well as explanatory patterns that drive this change, bearing in mind that pattern mechanisms are local rather than presumed to be universal (Sanderson, 1990). This book searches out those patterns and their directional consequences. For this reason, its perspective can be characterized as evolutionary. There are a few things to note about evolution before the aforementioned patterns can be further explored.

Evolutionary biology looks at development as a circumstantial selection out of variety. It deals with the question of how selection takes place through selection pressure and explores how variety is developed in order to enhance a species' fitness (cf. Dawkins, 1995; Kauffman, 1993).

Evolutionary economics has developed as an alternative to mainstream neoclassical economics. Core assumptions of the latter, such as the model of rationality and its focus on equilibrium situations, e.g. when demand and supply are balanced, have increasingly begun to be questioned. Several

economists have begun to look back at the predecessors of evolutionary economic theory such as Marshall and Veblen, who proposed a more dynamic perspective on economic phenomena (Hodgson, 1993). Various strands of evolutionary economics have been developed in the last few decades that share the goal of replacing comparative neoclassical economics with a focus on dynamic processes, in which institutional and technical change are no longer treated as external circumstances, but become endogenous to the systems being researched. Rather than focusing on the establishment of supposedly stable states, evolutionary economics focuses on the ongoing development of systems from one temporal state to another (cf. Nelson and Winter, 1982; Norgaard, 1984; Hodgson, 1993; Van den Bergh and Gowdy, 2000).

Evolutionary psychology focuses on the level of the actors and the individuals. It attempts to clarify the thinking and acting patterns people develop in order to enhance their fitness with the environment. Therefore it focuses on adaptation techniques and how the mind develops such techniques in order to cope with the surroundings of a person and the events that take place in a person's life, for purposes such as to prevent cognitive dissonance.

There is also a history of evolutionary approaches in sociology and anthropology. It was, in fact, the nineteenth-century sociologist Spencer, and not Darwin, who popularized the term 'evolution' (Hodgson, 1993). Early attempts to view societal change as a process of evolution were often characterized by progressive stages, with western society depicted as the climax of development. Social Darwinism developed the principle of 'survival of the fittest' as an ideological imperative. Later on, anthropologists in particular developed more elaborate views of societal evolutionary processes, with Steward (1955) emphasizing the multilinear paths that societies could take. Also in anthropology, the relationship between society and its natural environment has been described in (co-)evolutionary terms. In the 1960s, Parsons developed a specific view on evolution and society which was dominant for some time, and which was subsequently discarded because of its faulty functionalist tendencies.

This cycle of advancement of an evolutionary perspective and its subsequent abandonment is characteristic in the fields of sociology and anthropology. Recent attempts to reintroduce it have been characterized by an explicit rejection of the idea that evolution can be equated with progress, an awareness of the multiple causes of evolutionary processes and caution in using biological evolution as a model for societal evolution (Sanderson, 1990; Kerr, 2002; John, 1999).

It should be noted that many theories in the social sciences have an evolutionist character because they address the continuous change in social systems. Fewer theories, however, are evolutionary. For a theory to transcend the level of general system change to discuss the level of the exact workings of change, it should have the following characteristics (Kerr, 2002: 334).

First, it should focus on the dynamic and temporal dimensions of change. Second, it should emphasize the selection variables. Third, it should focus on adaptive processes. Fourth, it should recognise change as a process that is both contingent and path-dependent. These characteristics set out the requirements for the approach presented in this book. Evolutionary public administration as proposed in this book focuses on the *complex interactions between systems* and the *non-linear development* of governance structures and processes through time when they attempt to adapt to and cope with the ongoing changes in their environment.

### 1.3 UNDERSTANDING THE COMPLEXITY OF GOVERNANCE

This book attempts to map out an understanding of the complexity of governance systems and governance processes. This complexity is the proverbial explanatory variable for understanding why the output of governance processes often differs from initial expectations. The goal is to expand our understanding of complexity and its underlying patterns. The term complexity is often abused in the practice of governance: for example, by stating that “due to complexity my project failed”. Governance systems are assumed to be complex by definition. The scientific and practical added value of the substantive ‘complexity’ and the adjective ‘complex’ is that they indicate systems, characterized by interrelatedness between constituent parts, where the whole is different than can be expected from the sum of the parts because of the emergent characteristics of the coevolution and self-organization within and between systems. A reductionist approach solely focusing on parts does not generate an understanding of the whole. A systemic approach is required in order to achieve this. However, the whole does not exist on its own. It is not a new or more aggregated object of research that can be studied independently. The sum of the parts cannot be straightforwardly deduced from the whole. Complex systems must be analyzed by studying their (self-organizing) parts as well as the emergent patterns that result from their coevolution.

Therefore, a double challenge exists. First, a governance system must be studied as a whole without separating it from its parts, while it may still be different than expected from the sum of these parts. Secondly, the relationships between the parts must be studied, assuming that the relationships are mutual, emergent and dynamic, guided by the self-organizing capacities of each part and the unpredictable dynamics of their coevolution. In a departure from the complexity perspective, the argument in this book has been structured around three pillars: *non-linear dynamics*, *self-organization* and *coevolution*. The final portion deals with the findings on managing complex issues and presents the idea of process systems as a concept to help understand the complexity of governance processes.

## 1.4 EVOLUTION, COMPLEXITY AND GOVERNANCE

Complexity theory is central to our evolutionary approach as it allows for an understanding of the patterns that drive evolutionary change. Complexity theory is a systemic theory. Systems are nested; that is, they are embedded in larger systems, and continuous interaction between systems is essential to the research described here. “Complex systems [. . .] are nested in, have nested within them, and intersect with other systems” (Byrne, 2005: 105). This ‘nested-ness’ draws attention to the fact that the borders of a system depend on the judgments of the researcher and the agents within the system. The various aspects of complexity theory and the various methods of investigation are discussed within the chapters. Many good introductions are available in the literature (e.g. Byrne, 1998; Marion, 1999; Haynes 2003; Gerrits, 2008), so a thorough introduction would be redundant here. Still, a few words are required on our understanding of complexity theory and the evolutionary dimension in order to understand governance.

One of the focuses of this book is on systems’ internal (inter)actions. In complexity theory, a system consists of actors or agents, acting units that process information and act accordingly (cf. Holland, 1995). Systems exist because of the interconnectedness of elements. Therefore, agents or actors and their (inter)actions must be examined. Within governance systems, ‘adaptive’ behaviour can be observed as soon as the actors within the system attempt to adapt themselves to new system’s situations or try to influence their environment. In addition, it is not difficult to imagine that a variety of adaptive behaviours can lead to non-linear development of the system as a whole, especially when the reflexive character of human agents is taken into account. On the other hand, another focus of this book is on the external impacts of and on a system. There is, however, no objective boundary between a system and its context. Deliberate and well-grounded boundary judgments are therefore required to increase our understanding of governance systems. There are two types of boundary judgments: those made by researchers and those made by actors in the empirical cases studied.

The basic elements of systems are agents or actors. Actors can be made up of individuals, informal or formal groups and groups of organizations. This multiple appearance of the object of research results from the idea of nestedness. It is possible to look at an even more abstract system in which groups of organizations are considered to be an institutional system. This book deals with all system levels in its search for relationships and interactions which help explain the complex dynamics of governance systems. While this implies that causal relationships are searched out to be analyzed, the book also operates from the understanding that relationships are obscured by numerous connections with other elements and that human interpretation is inevitable.

For this reason, causality will not be searched out in the pure positivist sense but much more for patterns within complex systems and the resulting dynamics. The ideas of Nicolis and Prigogine (1989) are built upon this: the absence of simple causality is not a weakness of social science, but rather

a characteristic of the object of study. As complexity theory indicates, this idea is not restricted to the social sciences. It also applies to physical systems. The difference from physical systems is that the agents in social systems are reflexive, which means that the systems' constituent elements are capable of actively changing their regimen and surroundings.

Originally, the basic elements in complexity theory were thought to be of a non-reflexive nature. Examples of these are genes (cf. Kauffmann, 1993) and molecules (cf. Nicolis and Prigogine, 1989). Actors in social systems are reflexive: they respond, anticipate, plan, think, forecast, etc. This enhances the adaptive capacity of actors in complex social systems. Actors process information through their internal model and act accordingly. In the domain of public administration this means that actors can choose, within certain degrees of freedom, a certain response to a certain situation but also contradictory to the intention of the intervention. As such, learning and adjusting actors are constantly influencing the direction of the evolution of systems. That is the basic foundation of this book.

### **1.4.1 Complexity Theory**

The various aspects of complexity theory are discussed within the different chapters. Each chapter focuses on a certain dimension of complexity, presenting concepts that help to clarify it. However, it is first necessary to relate complexity theory to existing theories in the domain of public administration. This is the subject of Chapter 2, authored by Klijn and Snellen. They show that the concept of complexity has already been held to be of importance in this domain for decades, albeit under different nomenclature, and argue that complexity theory seems to be the logical next step in searching out an approach which enables us to obtain meaningful insight into the object of public management research because it is more explicit about the patterns of complexity.

In Chapter 3, Buijs, Eshuis and Byrne deal with the potential consequences of a complexity theoretical approach on methodology and the methods of research. Complexity theory was traditionally developed within the scientific field, thus giving it a rather positivist image. Physical systems, however, are only one aspect of our analysis; social systems are at least equally important. This leads to a hybrid research approach that combines a positivist analysis of the system as a whole with an analysis of the actions of agents and subsystems that necessitates a more constructivist methodology. It is argued that a dynamic method of making boundary judgments is required in order to understand complexity.

## **1.5 NON-LINEAR DYNAMICS**

Governance systems are dynamic. This statement is by no means novel but there are reasons to emphasize it. The term 'dynamic' has so far been

equated with instability. This requires further refinement. This book deals with both linear and non-linear, as well as both stable and non-stable, dynamics. Non-linearity refers to processes that are erratic. One characteristic of non-linearity is that an incentive given to a certain subsystem may result in a certain kind of behaviour at a certain time, but a repetition of this incentive may result in a different response. Another characteristic can be found in contingencies, chance events and the multiplicity of contexts. The results of a government's initial actions evolve from the interaction between the original design and the starting conditions in which it is implemented. Action that is successful at a certain time and place can sometimes generate a different output and outcome when applied elsewhere in time and place. Even when an approach is stable its results can be dynamic, due to context changes.

Governance processes are constantly unfolding and not clearly demarcated by beginnings and endings. The cases studied in the section on dynamics focus on long-term governance processes and show how dynamics in output, process and contexts change over time. Three sources of change are identified: chance events, multiplicity and emergence. Given the persistence of dynamics, management strategies should be sought out that deal with these dynamics rather than those whose aim is to create (artificial) stability.

### **1.5.1 Non-linear Dynamics in this Book**

Chapter 4 ('Appearances and Sources of Process Dynamics' by Teisman, Westerveld and Hertogh) is a study of the non-linear dynamics and the multiplicity of contexts in infrastructure projects in the United Kingdom and the Netherlands. The two countries differ widely in terms of the cultural and political contexts they present to the corporate organizations and executives responsible for implementing large, multinational infrastructure projects. The chapter focuses on how public actors navigate the dynamics as well as the physical and societal contexts of local and regional communities. The regime of principals and regulatory bodies in which the managers operate affects the realisation of the project in often unforeseen ways. Communities find themselves confronted with unexpected externalities and respond in ways that drastically contradict the managers' expectations.

Chapter 5 ('Non-Linear Dynamics in Port Systems' by Van Gils, Gerrits and Teisman) describes multilevel governance in managing the seaport systems of Hamburg and Rotterdam. The tumultuous relationship between powerful international corporations and local port authorities is fleshed out and the impact of events in different places of the nested port systems is examined. The core theme that these cases illustrate is that port development has to be realised in societal and physical subsystems that tend to be more active in unpredictable ways than managers would typically prefer. The political and societal environments change rapidly, and seldom in ways that suit the decisions of port authorities.



## 1.6 SELF-ORGANIZATION

In complex systems, actors and elements are continuously seeking to survive by exploring dynamic equilibriums within an ever-changing environment. A city region will attempt to maintain a valuable position in the international competition against other regions. An infrastructure project will attempt to strike a balance between the desires of the principal and the interests of stakeholders. A citizens' initiative must organize itself within the context of other initiatives, their grassroots and the political recipients who will implement the initiative.

The concept of self-organization captures the process of autonomous development and the spontaneous emergence of order out of chaos. This concept focuses on how processes come about, develop and change. Processes evolve out of events, actions and interactions and build a structure that can later be defined in terms of inertia, stability, dynamics and vaporization.

Self-organization is characterized in complexity theory as the emergence of new structures enforced by local interaction, without the imposition of any external or internal actors (Cilliers, 1998; Heylighen, 2002; Jantsch, 1980). Self-organization is the reflexive capacity of actors and (sub)systems who are able to receive, encode, transform and store information and use this to consider their actions. As will be demonstrated in the next section, where coevolution is the mutual influence between systems, self-organization is the internal capacity of elements within the systems to adjust and develop. It has already been noted that the distinction between the two is simply a matter of a boundary judgment on the actor or elements and the system. Still, the distinction is helpful. Self-organization is more closely related to the action of elements and systems on their own, while coevolution focuses more on system interactions, which are more often unintended and unforeseen from the agents' perspective. Coevolution extends beyond the realm of (relative) control. Self-organization also draws attention to the many 'uncontrolled' aspects of action in complex systems.

The use of the term self-organization challenges the assumption that an external or internal agent is or can be held responsible for guiding, directing or controlling in highly organized systems such as governance networks. Heylighen (2002: 8) argues that a controlling agent cannot be separated from the system. Those who define themselves or are defined by others as controlling agents operate within a complexity perspective self-organizing (sub)system. Their ambition may be to guide and control the complete system they are in, but this does not have to be effective at all. The variety of self-organization creates the capacity to control a system and to regenerate existing patterns, but it also governs and produces internal forces of change (Farazmand, 2003). Self-organization concerns every system that is performing in governance processes, whether or not it focuses on guidance and control.



The main focus of this book is on the self-organization of actors and their action systems. A distinction is made between three features (Portugali et al., 2000: 51). First, self-organization can be used to attain an existing structure and maintain it. This idea is known as autopoiesis (In 't Veld et al., 1991). Second, a system with a flow of energy and matter through its boundaries can create or invent new content and new modes of behaviour. Self-organization therefore has a creative and adaptive feature that can lead to changes in the course of the self-organizing unit. Third, a self-organizing system is composed of a variety of elements. These elements are too numerous and diverse to identify clear causal relationships between them. They are interconnected through a complex network of feedback loops. This feature makes it difficult to picture the behaviour of an agent or system. This third feature is a common characteristic of governance networks. In such a case, a compounded system with interconnected and highly ambivalent agents can still look like a stable one even when it is in a rather unstable state of equilibrium that can easily be lost. Erratic (and unforeseen) process dynamics can thus be expected, as observed in several of the case studies presented in this book.

Some assumptions can be made about self-organization as a guiding principle for actors and systems. These include the fact that it is not guided by an external force, but by internal reflections on what happens in the larger system and what has to be done in order to survive. The reflection can result in actions to remain on an existing course or to change course. It can also lead to ambiguity and instability. Out of the combination of these self-organizing actions, governance processes will enrol and collective action will (or will not) result.

### **1.6.1 Self-organization in this Book**

Traditionally public administration has tended to focus on steering the activities of formal government entities and politicians. This focus is often combined with the assumption that these entities are in charge of fulfilling the needs of society that cannot be fulfilled by market mechanisms and market parties. There is a variety of products that are important but that are assumed not to be able to be produced by market mechanisms. Furthermore, the government is considered to be responsible for law-and-order activities. In this traditional approach, self-organization is often seen as the counterpart of guidance and control. The self-organizing capacities of business and society are at least potentially inclined to place self-interest above joint interest. From this viewpoint, administrators' tendency to focus on their own steering abilities, correcting misbehaviour of deviant citizens and private enterprises is more understandable. This focus, however, does not help to increase our understanding of governance processes, let alone enhance their 'governance capacity' or help managers influence them. It simply highlights a portion of that process

and leaves out non-guiding actions which can make an even larger contribution to processes of collective action.

Self-organization is presented in this book as an organizing principle that is as important as the traditional concepts of guidance, steering and control. Guidance, steering and control can be complementary to this fundamental concept, but cannot replace it. Without self-organization there can be no effective guidance, steering and control. In Marxist terms, self-organization can be seen as the substructure while guidance, steering and control can be seen as the superstructure. The first cannot exist without the second and the second can only be effective if the first exists.

Furthermore, it is assumed that the effectiveness of steering is largely a function of the congruency with existing or emerging self-organizational capacities within the system that is steered. Several chapters discuss what happens with steering activities if they do not fit in with the characteristics of the object of steering.

Chapter 6 ('Metropolitan Regions as Self-Organizing Systems' by Van der Bol, Buijs, Teisman and Byrne) is a study of organizational and managerial behaviour in multilayered, multiscaled systems in metropolitan regions. The authors focus on the polycentric metropolitan region of the Randstad, which is the conurbation of Amsterdam, Rotterdam, The Hague and Utrecht in the Netherlands. This metropolitan area suffers from erratic governance systems. None of the governments of these cities has enough power and resources to play a dominant role in international competition. They need to develop cooperative management strategies in order to keep their metropolitan region economically, socially and creatively competitive. The chapter explores the strategies that emerge from more informal networks and arenas as attempts to ensure survival, and separates the effective from the redundant.

Chapter 7 ('The Complexity of Self-Organization: Boundary Judgments in Traffic Management' by Pel) focuses on two contrasting subsystems within the field of traffic management. The first subsystem is the technical system optimisation approach. The existing rules and ways of thinking and working on traffic management are considered to be acceptable within this system. Its aim is to improve the efficiency of the existing system. Dynamic traffic management takes into account the adaptive self-organizational abilities of technical systems like traffic lights. At the same time, however, the subsystem focuses on reproducing rulings and ways of thinking and acting with respect to the human system. As a basis for comparison, the author presents the 'shared space' community as a complementary system that challenges the technical approach and promotes the self-organizing abilities of travellers. This can be regarded as an example of adaptive self-organization. At the same time, however, the shared space moment also has autopoietic characteristics. This leads to a theory on hybrid subsystems, i.e. systems that are autopoietic and adaptive at the same time, depending on the boundary judgments of the system and its researcher.

## 1.7 COEVOLUTION

In shifting attention away from the human actors towards the systems, the concept of coevolution assists in achieving an understanding of how systems change through time because of mutual influence (Norgaard, 1984, 1994; McKelvey, 2002; Gerrits, 2008). The coevolutionary perspective allows for an understanding that systemic change is polycentric, i.e. stemming from mutual interaction, rather than (super)imposed. This concept is utilized to indicate the development of governance processes beyond the realm of control. Coevolutionary processes explain the feeling that systems develop relatively autonomously from the actions of actors. The focus here is on the long-term development of the system as a whole, in which actors make up just one of the many variables influencing the whole process.

Applying the notion of coevolution to the study of governance sheds light on the unexpected dynamics of processes. Processes evolve through interactions between their constituting elements, actors and content. However, they are also under the constant influence of surrounding processes. For example, a collaborative governance process also comes under the influence of political processes, juridical procedures and other policy initiatives and its development and outcomes can only be explained by taking this coevolution into account. As a result of positive feedback processes in which a small change is reinforced by subsequent developments, it is possible for a system to make the leap from one system state to another (cf. Stacey, 2003), resulting in a situation of dynamism or can even cause a system to dissolve. Negative feedback, in which changes in elements or systems are dampened by the reactions of other elements and systems, can bring a system into a situation of stability or even inertia (Van Buuren and Gerrits, 2008).

The velocity of change between states is not regular. The concept of punctuated equilibrium (cf. Baumgartner and Jones, 1993) states that the velocity of change is characterized by periods of relative stability and rapid change as systems respond to pressure. Change does not stem from the moment the change is perceived but rather from the build-up of pressure during periods of relative stability. Once a system has moved to a new temporarily stable state, or attractor (Arthur and Durlauf, 1997), it becomes difficult to undo that change.

The changes to a new state do not always take place. Systems can instead get locked in (Arthur, 1994). This means that more energy is required to leave a certain state than to remain in that state, even if the current situation is unfavourable for many involved. As long as attempts to leave the situation generate more unfavourable responses than continuing to remain in the current situation, leaving the situation provides no short-term rewards.

Traditionally, the adjustment of public organizations to their environment has been regarded as a one-way process: after a period of stability, a new situation emerges. The organization experiences a disconnect between its internal order and the environment and adjusts its internal order to this

new situation. A new state of stability is created. It is assumed that an optimal internal order can be achieved to deal with the environment in an effective way. Such an approach (cf. contingency theories, Termeer, 2004), however, assumes that a stable fit can be created.

The coevolutionary perspective posits, however, that systems continue to develop because of mutual interaction and that a good fit is unlikely or a product of chance. Further, the very act of creating a good fit alters the situation in such a way that the fit is lost even before it is established. It is therefore safe to assume that the public sector is always evolving without ever achieving a continuous stable state of equilibrium. Since a variety of attractors exists, the trajectory of developments in the public sector may display an erratic course (Gerrits, 2008). Coevolution as a concept for understanding public sector dynamics refers to a variety of levels and interactions and the mutuality of interactions: there is no unilateral change, but always a mutual, dynamic influence.

### **1.7.1 Coevolution in this Book**

The fourth part of this book centres on the topic of coevolution. If non-linear dynamics characterize the normal state of public sector developments, and if managers must resort to self-organization in order to get things done, it would be in the interest of theorists and practitioners to shift their focus from the best means of reorganizing governments to suit the environment, to the question of how system developments occur. The argument is that changes to the systems are often unforeseen because of the coevolutionary nature of system development.

Chapter 8 ('Coevolution: A Constant in Non-Linearity' by Gerrits, Marks and Van Buuren) presents a theoretical framework for understanding coevolution. This framework is applied to a very specific relationship that is often neglected in public management theory and practice, namely, the interaction between social and physical systems. Two cases are presented here—the management and development of the Unterelbe estuary in Germany and that of the Westerschelde estuary in Belgium and the Netherlands. Both cases show policy systems that are required to deal with the erratic dynamics of the estuary. An analysis of the coevolution between developments in the physical and policy systems demonstrates that some patterns are more successful in managing physical systems than others. Successful management helps to reduce the chances of sudden, unfavourable physical changes.

To demonstrate the versatile nature of the concept, coevolution is applied to collective public action in Chapter 9 ('Public Policy-Making and the Management of Coevolution' by Van Buuren, Gerrits and Marks). Collective action is not a homogeneous stream of ambitions which are merged into coherent decisions. Instead, it is a composite system, involving a stream of knowledge about the physical system the collective action is concerned

with, a stream of perceptions about interventions in the physical systems and a stream of ambitions of stakeholders about the desirable decisions. The three streams coevolve, often leading to diverging but sometimes to converging outcomes. The empirical case study here is the planning for the Gouwe Wiericke polder in the lowlands near the Dutch city of Gouda.

## 1.8 MANAGING COMPLEXITY

The framework derived from complexity theory and evolutionary approaches helps to increase our understanding of complex governance systems. This book argues for and illustrates how complexity is the most important explanation for why public officials and organizations have difficulty getting things done. No attempts are made to shy away from confronting the problem of, if the analysis presented here is correct, how officials should try to get things done. Two chapters have therefore been included on managing complexity. A complexity theoretical approach challenges the assumptions of structuring promoted, among others, by new public management (e.g. Ferlie et al., 2005; Pollitt et al., 2007). The new public management paradigm argues that implementation should be organized as far as possible into agencies or by way of performance contracts. Its main focus seems to be, once again, on the internal order of a single organizational unit. Not much attention appears to be paid to the interdependency and interactions between these units and their environments.

This portion of the book builds upon the governance theories developed in the domain of public administration. The concept of governance brings management and policy together in a complex constellation of joined-up government and third-party government. Goldsmith and Eggers (2004) argue that implementation problems are mainly about the blurring borders between the public and private domains and about the interconnections between different levels of government. Rather than trying to ‘fix’ this blurring, it is argued that officials should operate from the understanding that blurring is inevitable. It will be argued that public management involves a combination of stability and dynamics (see also Teisman, 2005). This should not be viewed as a dichotomy but rather a tension that must be dealt with. The term ‘paradoxical management competence’ is used to capture this tension.

### 1.8.1 Managing Complexity in this Book

Chapter 10 (‘Managing Complex Process Systems: Surviving at the Edge of Chaos’ by Edelenbos, Klijn and Kort) re-examines the management approach of focusing on getting a certain job done despite all kinds of unwanted dynamics and opposition. This approach can be found in the literature on project management. The chapter indicates that projects that are

embedded in complex systems go through different stages. Each stage has its own particular dynamics that require a particular approach to management. It especially requires a mix of both project and process management in order to utilize the existing dynamics in a way that benefits the project. Failure to do so would mean that the project either becomes embroiled in turbulence or stuck in inertia.

In Chapter 11 ('Dealing with Complexity through Trust and Control' by Edelenbos and Eshuis) trust and control are not treated as a dichotomy of choice, but rather as coexisting ingredients of a combined strategy to deal with complexity. The relationship between trust and control is re-examined in terms of coevolution, and synergetic effects between trust and control are analyzed using two case studies.

## 1.9 OUTLOOK

The authors are well aware that our approach to issues of governance and our theoretical choices may create more new questions than the answers we attempt to provide. We do not want to shy away from a critical review of our approach. Christopher Pollitt was therefore invited to present his review of the added value of complexity theory and this book in Chapter 12. His view represents the community that questions the added value of this approach. This critique is certainly quite valuable. In the final chapter, authored by Boons, Van Buuren, Gerrits and Teisman, attempts are made to answer the questions that Pollitt poses. This chapter argues that complexity theory and the evolutionary approach will help public administrators to improve their understanding of complex governance processes. In order to show this added value, the authors present the research object as it emerges from all the chapters in this book: as a *multilevel process system* that increases our understanding of complexity. Furthermore, it is argued that the application of self-organization and coevolution as concepts enriches the debate on guidance and control and that a theory on a hybrid management approach combining seemingly contrasting strategies really helps in achieving an understanding of the dynamics and evolution of governance processes.

Process systems, as presented in the last chapter, display various states of dynamics. These dynamics have consequences for its function and the management options available. Essentially, four system states are identified that can be seen as increasingly dynamic, unstable and changeable: an inert system, a stable system, a dynamic system and a chaotic system.

This book provides examples of processes that become rigid and paralyzed. Actions of individuals or organizations occur, but there is no observable progress in terms of what the actors in the process desire or in terms of output. Such a system is inert and unable to achieve new states of equilibrium due to internal development or external pressure. There are also processes

that develop according to the expectations of (one of) the initiators. The process looks stable and predictable and delivers suitable outcomes, but it is not able to innovate and is vulnerable to system shocks. Examples of non-linear and dynamic processes are also presented. This appearance is argued to be the ‘normal’ state of governance processes as complex developments are subject to a variety of guiding or intervening actions and events. Actions and events generate pressure on governance systems and result in a continuous quest to find new equilibrium states. Finally, there are chaotic systems: systems that are continuously and restlessly in motion without ever finding a stable equilibrium. They are on thrift and are hardly able to generate added value to their environment (see Table 1.1).

Non-linear processes can lead to highly appreciated results, just as stable processes can. At the same time, non-linear processes can lead to disappointments as can stable processes. All four appearances will be found in complex governance systems and systems can evolve from one system state to another. The two main driving forces behind system development are self-organization (within the system) and coevolution (between system elements and between systems). The four system states have different levels of governance capacity and pose different kinds of demands to public management.

The desire to understand governance processes and their development is based on insights from evolutionary thinking that have emerged in disciplines ranging from physics to literature, and from history to philosophy. The public administration, management and organization communities are clearly beginning to take more of an interest in this approach (see, among others, Kickert, 1991; Flood, 1999b; Murray, 2003; Mitleton-Kelly, 2003; Haynes, 2003). Most of the aforementioned research describes the core concepts in evolutionary thinking (cf. Waldrop, 1994; Rescher, 1998; Marion, 1999; McKelvey 1999; Van den Bergh and Gowdy, 2000). We hope that this book is helpful in facilitating an understanding of the evolution of process systems in governance issues.

*Table 1.1* An Ideal Type of Process Appearances (‘System States’)

	<i>Stable</i>	<i>Dynamic</i>
productively	Stable processes that develop according to expectations due to an absence of ‘disturbance’ or due to a management ability to control the process	Dynamic processes that develop in a non-linear manner in deviation from initial expectations due to unexpected events, but that still manage to generate satisfactory results
unproductively	Processes that are controlled well, with clear guidance and goals, but still unable to generate progress (inertia)	Processes that develop in an erratic pattern, challenging existing stable progress, but that are unable to generate a ‘new order out of chaos’ (evaporation)



# 2 Complexity Theory and Public Administration

## A Critical Appraisal

*Erik-Hans Klijn, Ig Snellen*

### 2.1 INTRODUCTION: COMPLEXITY THEORY AND PUBLIC ADMINISTRATION

The introductory chapter has made mention of the growing interest in the use of complexity theory in the social sciences. However, this attention seems to be lagging in the domain of public administration. Relatively few articles on complexity theory have been published in well-known public administration journals and even fewer contributions apply complexity theory to public administration phenomena.

This does not mean that absolutely no trace of complexity theory can be found in public administration thoughts or research. Despite the fact that rational models of policy-making and policy analysis have been very prominent, criticisms of these models have been voiced for a long time and authors have stressed the erratic, non-linear character of policy-making and decision-making processes. The history of the field of public administration could be viewed as an ongoing attempt to search for concepts to grasp the complexity of day-to-day practices in policy-making and decision-making (see Klijn, 2008).

A good way to try and assess the usefulness of concepts from complexity theory in the field of public administration is not only to elaborate upon these concepts but also to look for existing concepts in public administration and see where ideas match, can improve upon each other or where they provide different perspectives. For this purpose, the connection between various theories and ideas in the public administration discipline and the three pillars of this book—non-linear dynamics, self-organization and coevolution—is explored. First, the development of public administration theory and how it attempts to incorporate notions of complexity is sketched out (Section 2.2). This will show that in some ways, public administration has been searching out new concepts to deal with complexity for quite some time. A discussion of the ideas of non-linear dynamics, self-organization and coevolution along with their related concepts in public administration follows in three separate sections. This is followed by a discussion of management and the role of the manager, comparing this to possible views on (public) managers from a complexity theory point of view.



## 2.2 DEVELOPMENTS IN PUBLIC ADMINISTRATION: TOWARDS COMPLEXITY?

The late 1950s were the heyday of *total systems* thinking. In planning and policy-making, all possible relevant variables were ideally taken into consideration. In sociology, the work of the structural functionalist Parsons (1951), who emphasized the stability of social systems and the functionalistic mechanisms that kept systems stable, was dominant. The sociological point of departure that various elements of society are related to one another and form an integrated system incited the aspiration to develop all-inclusive models of society for the purpose of policy-making in different sectors of society, and to frame theories according to those models. Ideas of a system approach were combined with ideas on rational decision-making to generate theories that stressed a comprehensive understanding of society with a rational weighing of alternatives. A strong cybernetic idea of society and the way it could be steered was being developed (Easton, 1965; Quade, 1975). This idea also became visible in the construction of planning bureaus or planning procedures that could generate information on societal processes to steer them.

Within the realm of the theoretical development of public administration, there are two clear developments. One is growing attention to the fact that policies are made and implemented in a multi-actor setting. This is called the *structural line* of development of actor constellations. The other development is that there is more and more attention being paid in the domain of public administration to the fact that there is not one understanding of the policy reality, but rather that there are many interpretations. This is called the *epistemic line* of the actor constellations.

These two developments, that do not necessarily always complement each other, have increased awareness of complexity in the public administration phenomena. This development begins with early criticisms of the cybernetic approach to policy-making.

### 2.2.1 Criticism of Rational Comprehensive Approaches: Lindblom's Incrementalism

Braybrooke, Lindblom, March and Simon have criticized the approaches in policy science to model building and theorizing for practical policy-making as unfeasible, and thus unrealistic and contrary to actual policy practices. Lindblom's proposition of a "Science of Muddling Through" (1959) and Simon's ideas about "Bounded Rationality" and a "Satisficing"-oriented search process (1955) are the most famous critiques of the "rational comprehensive method" of policy-making. Against the, at the time, dominant, all-encompassing, rational comprehensive approach (a "root" method), they suggested an approach by small steps, limited aspirations and successive limited comparisons (a "branch" method). According to Lindblom, the policymaker "would not ordinarily find

a body of theory<sup>1</sup> precise enough to carry him through a comparison of the respective consequences". He continues: "In actual fact, therefore, no one can practice the rational-comprehensive method for really complex problems, and every administrator faced with a sufficiently complex problem must find ways drastically to simplify" (Lindblom, 1959: 84).

Simplification can be achieved by renouncing an ultimate clarification of values and the objectives derived from these values, and by giving up the idea that encompassing theories lie at the heart of policies. Instead of this, policies should be developed that are aimed at solutions to problems as close as possible to the symptoms of the problems. This is advocacy for a "remedial" (Lindblom, 1965: 147) approach to policy problems. For the policymaker, the removal of obstacles, which can block improvements in an undesirable situation, is in complex situations more rational than "to formulate in his mind an organized set of policy aspirations and to specify for various dates in the future the income, educational, status and other social goals at which policy should aim". "That is, if they (the policy makers) cannot decide with any precision the state of affairs they want to achieve, they can at least specify the state of affairs from which they want to escape. They deal more confidently with what is wrong than with what in the future may or may not be right".

Lindblom (1959) proposes an approach that aims at small (incremental) steps in moving away from the problem situation. Later (1965) he combines this with what he calls "mutual partisan adjustment". In this way policy changes are achieved through mutual bargaining and persuasion. In fact, the plea for mutual partisan adjustment is the interactive dimension of the disjointed incrementalism, which represents the content/cognitive side of policy processes.

### 2.2.2 Rational Conceptualization of Public Administration

The pioneering work of Lindblom and Simon did not hold much ground in the professional circles of policymakers and their scientific advisors at the time. The conviction that societies can be created was at the time supported by the "General Systems Theory" (Von Bertalanffy, 1955), "Industrial Dynamics", "Urban Dynamics" and "World Dynamics" (Forrester, 1961, 1969, 1971), and "Cybernetics" (Wiener, 1948). They promised to bring the interdependencies and dynamics of whole societies, and sectors thereof, within the intellectual and practical grip of mankind.

The contribution of the policy sciences to politics and policy-making consisted of improvements of the *procedures* of policy-making and improvements of the scientific quality of the *content* of policies. Every policy was perceived to rest on certain assumptions with respect to the causality of problems in policy sectors. The task ascribed to the policy scientist is to try and determine the correct causal theory for the problems, and to propose the correct measures to be applied to the problems. Thus,

the policy theory—as the basic assumptions on which policies have to be formulated—consists of a normative theory, next to a policy field theory and a policy instrument theory.

- The *normative theory* establishes the normative connections between overarching value orientations, policy goals and operational goals. In technical terms this often translates into a hierarchical structure of goals and sub-goals (Kuijpers, 1980; Dror, 1986).
- The *policy field theory* provides the causal chain(s) which makes explicit the variables that create a policy problem in a sector of society, and the variables that politicians can choose for a (more or less effective) intervention in the causal chain. Research is the more or less objective basis on which a field theory is created (Quade, 1975; Hofferbert, 1974; see for a criticism: Lindblom and Cohen, 1979).
- The *policy instrument, or policy effect theory*, provides insights into which policy measures are required or most effective in achieving a certain policy goal. A policy instrument or policy effectiveness theory relates action and sub-goals to the final goals to be achieved by a policy. It indicates which actions and sub-goals have to be attained to achieve a specific policy goal. Instrumental nomothetic theories are required to clarify the causal relations between actions, sub-goals and final goals. Such theories may also be required to gauge possible intended and unintended consequences and/or externalities of a policy.

It may be apparent by now that these approaches are fundamentally opposed to Lindblom's disjointed incrementalism. A full-fledged policy theory requires a clarification of all values involved, as well as their order of priority. It requires a complete picture of the cause-and-effect chains of policy problems. It also requires instrumental-nomothetic insights into the effectiveness and efficiency of policy instruments. This requires a continuously extensive search for relevant policy variables, such as the motives for action of agents, and of effects and by-effects. Thus, the search for the three theories in fact comes very close to the synoptical approach that Lindblom has criticized.

### 2.2.3 From Policy Theory to Policy Arena: Complexity in Actor Constellation

While public administration theory was still rather rational and system oriented, much attention was being paid in the field of political science to the phenomenon of well-integrated groups of actors who dominate certain areas of decision-making. This wave of research into triangles or subsystems (Freeman, 1965; Freeman and Parris-Steven, 1987; Jordan, 1990) came out of the famous elitist–pluralist discussion in the 1960s. This discussion

raised the question of whether or not power was divided relatively equally. It drew attention to the fact that various powerful groups can be seen to be participating in various decision-making spaces (like Dahl stressed; see Dahl, 1956) and that power does seem to be divided rather unequally amongst groups. As a consequence of this debate, a lot of research was conducted on agenda setting and on the question of which actors dominate this setting of agendas (Cobb and Elder, 1972). The iron-triangle and subsystem literature emphasizes that solid coalitions of actors often exist around subsectoral decision-making that successfully excludes other actors. This is a clear break from the idea that there is one actor in decision-making. On the other hand, a lot of this literature also emphasizes that these coalitions of actors often hold the same policy views or policy paradigms (see Benson, 1982; Laumann and Knoke, 1987). In this sense, then, there is no epistemic counterpart to the structural side of iron triangles, and the idea is retained that policy can be based on unified ideas about goals, means and instruments (Colebatch, 1998), an idea that can also be found in Sabatier's writings on belief systems (Sabatier and Jenkins-Smith, 1993). These ideas thus work from structural diversity (many actors) but with cognitive unity (more or less one common point of view on policy problems and solutions).

The picture of iron triangles did not go undisputed. Rainy (1997) has stated that the picture is too simplistic for at least two reasons. First, policy collectivities normally contain more than simply the three participants mentioned. A wide variety of interest groups is usually present. This criticism applies less to some of the other concepts such as subsystems (Freeman, 1965) and the later policy communities (Rhodes, 1988), which clearly allow room for more actors. Second, different levels of government are involved in the implementation of iron-triangle policies (Sabatier and Jenkins-Smith, 1993). Iron triangles appear to be strong and closely knit policy communities or policy networks. Interestingly, later writers (Milward and Wamsley, 1985) have sketched an image of a network structure in which sector networks consist of vertical and horizontal ties between public and private actors.

## **2.2.4 From Policy Arena to Policy Process Theory**

The scientific policy analysis approach via the construction of policy field theory and policy effects theory, as indicated earlier, was fiercely criticized during the last few decades. The main arguments against this approach were that there may be as many policy theories as there are stakeholders, that the government is not always, or even mostly, a dominant stakeholder who determines the theory which will be applied in the policy field and that the political rationality has, or has to be given, priority for the scientific rationality.

Research can be very interest-bound (see Lindblom and Cohen, 1979) and is not required to provide a solid base at all. It may even be the instrument with which the struggle between interests continues if all the parties

involved perform their own research. Political rationality requires that compromises are made that are vague enough to allow contending parties to maintain that they have realised their purpose. The exact give-and-take process between the different parties and interest groups has to be concealed. This concealment may start with the framing of the policy theory *on which the parties to a deal decide to agree*. Policy theories are, in a political context, not scientific assumptions but rather *negotiated* pictures of reality to which the parties in a political deal agree to adhere. As a consequence of this, the processes through which policies come into existence are much more important for the development of policies, and therefore deserve more attention than policy theories.

Policy theories, on which *multi-actor* policies are based, are necessarily much more complex than theories in situations dominated by one actor or by a tight group of actors (Snellen, 1982). In multi-actor situations—which are the normal policy development situations—there is no linear theory about the causal relationships in the policy field. On the contrary, in the “policy theory” (the narrative on which a policy is based), diverse perspectives of the networks of stakeholder organizations, which relate to the different possible intervention variables, have to be taken into account.

### 2.2.5 From Policy Process Theory to Network Theory

This multi-actor perspective is taken further by network theories on policy and decision-making. The policy network approach also focuses attention on the interaction processes between interdependent actors and the complexity of objectives and strategies as a consequence of that interaction. An important difference with the process model is that in the network approach, more attention is paid to the institutional context in which complex interactions take place. In an attempt to elaborate on the institutional context of complex interaction processes, network theoreticians are inspired by inter-organizational theory (Levine and White, 1961; Negandhi, 1975; Aldrich, 1979). This theory states that in order to survive, an organization requires resources from other organizations. These organizations engage in exchange relations with one another in such a manner that a network of mutually dependent actors emerges. Network theory combines a structural view of plurality (many actors, divided resources) with a cognitive view of plurality (actors have different frames and see problems differently).

“The recent interest in the concept of policy networks can be seen as an attempt to “contextualize” the process approach. Not only does policy making take place in settings where there are many actors and there is ambiguity regarding preferences, information and strategies chosen, but it also occurs within certain inter-organizational networks of a more lasting nature. The policy network approach thus takes up where the process approach leaves off. Problems, actors and perceptions are not chance

elements of policy processes but are connected with the inter-organizational network within which these processes occur". (Klijn, 1996: 116)

Cognitive unity in a network approach to policy-making is not without its problems and is seen as a process of bargaining and connecting different perceptions.

### **2.2.6 Conclusions: Developments in Public Administration Theory**

In the domain of public administration, a development from compatibility in the cognitive and structural dimension to variety in structural as well as cognitive dimensions in the network approach can be seen. As a consequence, there is a gradual but steady retreat from a structural and cognitive unity as a basis for policy-making. Gradually the complexity of the multi-actor settings and of policy theories is recognised—at least in some sectors. In the context of this publication, the following developments in public administration theory can be derived from the analysis presented thus far.

1. Policy theories in which government is the main or sole actor are gradually replaced by policy theories in which small groups, and later, networks of interconnected actors, factors and systems play a dominant role. As a consequence of the divergent convictions and interests involved, the linear cause–effect policy theory approach has lost much of its validity (in certain sectors).
2. Government-centred approaches to policy-making are in some sectors being replaced by governance-centred approaches. Through the adoption of civil society into the policy-making process, the dynamics within some parts of public administration have become too large to contain in one policy theory. Here, policies are the outcome of almost unpredictable interconnections of actors, factors and circumstances. As far as they are concerned, policy theories are (at least in those sectors) on the retreat.
3. Implicit in the developments mentioned earlier is that a hierarchical, vertical, top-down approach to policy-making is, in those sectors, replaced by an interactive, horizontal, bottom-up approach. In this way, room is created for activities by initiatives in society.

Complexity theory is attractive to the public administration discipline, which is confronted by these developments, because of the concepts and models it presents. Especially within the sectors of infrastructure, physical planning and project development, in which the conditions under 1. to 3. tend to be the likely state of being, complexity theory adds much value. The next section presents a discussion of whether the concepts developed through complexity theory are helpful in getting a handle on the complexity of policy-making, and how to manage this complexity.

## 2.3 NON-LINEAR DYNAMICS IN COMPLEXITY THEORY AND PUBLIC ADMINISTRATION

Complexity theory is founded on the understanding that non-linear dynamics result from the complex behaviour of elements, subsystems or other systems. This section will first discuss briefly the dimensions of the idea of non-linear dynamics and where it originates from. It will then explore related ideas in the discipline of public administration that complement the theoretical ideas of complexity theory.

### 2.3.1 Non-linear Dynamics in Complexity Theory

Complexity theory states that non-linear dynamics are the result of interactions and the interconnectivity of separate agents within or outside a system. In certain respects this is not a very new idea, because most existing theories, at least in the social sciences, stress complexity as a result of interconnection. In fact, most social science theories stress that relatively autonomous actors (individuals, groups and organizations that can act as a unit) are connected to one another and may affect one another and the interaction patterns that occur in a larger unity of actors (i.e. in a system).

The difference is that complexity theories argue that there are many different sorts of connectivity and that it exists between different systems, but also that the dynamics of that complexity can be linear or non-linear. This means that not only are those changes looked upon where an increase or repetition of incentives or factors will lead to a certain proportional amount of change as response (linear dynamics) but also that an increase in a certain incentive or factor can create a disproportional effect, or that at a certain time thresholds are reached at which point unexpected effects occur (non-linear dynamics). It is certainly quite interesting to consider this idea of non-linear dynamics in the social sciences, where situations with social systems that seem quite stable but suddenly change as a consequence of a relatively innocuous-looking event abound. One example of this is the sudden collapse of the Eastern European communist countries at the end of the 1980s after some East German citizens were allowed to leave. As a result of this exit option, which did not previously exist, the entire East German system collapsed and led to a chain reaction in which many other communist regimes also collapsed. Although many people were able to provide perfect explanations afterwards, the collapse did come as quite a surprise to most observers.

Thus, it can be concluded that dynamics arise out of the dependency and connectivity of separate agents within a system. A system may be in a position of equilibrium or in a position far from equilibrium in which it is sensitive to change. Stability and change for a system is achieved through feedback mechanisms that stabilize or disturb systems.



### **2.3.2 Attention to Non-linear Dynamics in Public Administration**

System ideas in public administration can be traced back a long time, as shown in the example in the previous section. The most well-known use of classical system theory in the field of public administration is Easton's (1965) system model of political life, where inputs (support and demands) are processed to outcomes (authoritative decisions) and information about outputs and effects function as feedback for new inputs. Despite the fact that in models such as Easton's, explicit references to system theory can be found, most of these models were rather static<sup>2</sup> and did not focus on dynamics, and certainly not on non-linearity. The system remained largely a black box in Easton's model. After a period of considerable attention being paid to this model in the 1960s and 1970s, attention dissipated and the model was replaced by other theories that paid more attention to the complexity of decision-making.

Elements of complexity theory, such as ideas on dependency, unpredictability and connectivity, can be found in several of the theories on complex decision-making that emerged in the 1970s and that were discussed in the previous section. Ideas on decision-making, such as the metaphor of a garbage can (Cohen et al., 1972), Lindblom's work on incrementalism and mutual partisan adjustment (Lindblom, 1959, 1965) and Allison's work on decision-making as games, highlight theories that stress the multi-actor characteristic of decision-making processes that lead to their erratic nature. All these theories stress that actors are interconnected and that their strategies influence one another. These ideas also inspired the studies on implementation that show that many deviations can occur from the moment a policy is designed at the central level to the moment it is implemented (see Pressman and Wildavsky, 1973; Hjern and Porter, 1981; Barret and Fudge, 1981; Hanf and Toonen, 1985).

Ideas on these interconnectivities between actors can also be found in a wide range of literature on strategies that have emerged in business administration as well as in economics and public administration. Authors such as Mintzberg emphasize the complex character of strategic processes, where some strategic patterns may have been intended but where many tend to be emergent and arise out of reactions to unexpected external events or as reactions to other actors' strategies (Mintzberg, 1979). This attention to strategic complexity and interconnectivity can also be found in the literature on game theory (Morgenstern, 1951; Scharpf, 1997), where decisions are presented as a result of interactions between various actors' strategies and where the patterns of strategies are considered to greatly influence the outcomes.

Many elements of these theories can be traced to the attention paid to governance, a debate that came up in the 1990s. The literature on governance (Martin and Mayntz, 1991; Kooiman, 1993; Pierre and Peters, 2000) focuses on the dependence of governmental organizations on a wide variety of societal organizations for the formation and implementation of policy and the delivery of public services. It is precisely the dependency and



the interconnections that form the central element in these theories of governance. They also stress the randomness of the outcomes between actors because of these interdependencies.

This also holds true for the theories that are most dominant in this governance perspective: the network theories (Hanf and Scharpf, 1978; Rhodes, 1996; Kickert et al., 1997). The dependency between various actors, especially resource dependencies and their power dimensions, is the basic characteristic that causes networks of actors to be developed and sustained (Hanf and Scharpf, 1978; Rhodes, 1997; Kickert et al., 1997; Koppenjan and Klijn, 2004; Sorenson and Torfing, 2007). Most network theories focus on the complexity of interactions that arise out of these dependencies, the resulting policy outcomes and the possibilities and limitations for guiding and governing these interaction processes.

### 2.3.3 Relevance to Public Administration

The ideas of dependency and connectivity are very interesting to modern public administration in which decision-making has become more complex and more horizontal and in which governments have a less prominent and hierarchical position. However, these ideas have been explored in the public administration field since the 1970s through several theories, such as inter-organizational theory and implementation theory (Hjern and Porter, 1981) as well as in network theory (Hanf and Scharpf, 1978). Thus, in this way, they are not quite so new. It can even be argued that these ideas of the unpredictability of outcomes because of dependencies and connectivity are better developed and have been the subject of more advanced empirical analyses in the domain of public administration than in complexity theory.

The ideas of predictable systems and non-linear dynamics are probably more interesting because they are one step further on the road already being traveled by public administration. The big question, however, is how we can transform these interesting ideas of non-linear dynamics, feedback and unpredictability into a conceptual framework, where relevant and interesting empirical research into public administration phenomena can be made.

## 2.4 SELF-ORGANIZATION

Except perhaps in theories about street-level bureaucracies and discretion, self-organization was mostly neglected in early theories on public administration. Traditionally, public administration focused mainly on goal-setting for public bodies and the way these goals could be achieved (Braybrooke and Lindblom, 1963). However, recently more attention has begun to be paid to steering limits because of the autonomy of other actors and the complexity of society. It is thus interesting to see how ideas about

self-organization in complexity theory can contribute to further theorizing on this topic in the domain of public administration.

### **2.4.1 Self-organization and Order in Complexity Theory**

Many theories on complex systems stress that systems are governed by a spontaneous order: i.e. that they are self-organizing. Complex systems display emergent properties because of the interactions between their individual elements (Mitleton-Kelly, 2003). In this way, the macrostructure of the system is related to its microstructure (the interactions between its agents) without the need for detailed active steering (Checkland, 1981). There are different views in the various branches of complexity theory on how spontaneous this self-organization is. While the literature on bounded instability stresses spontaneity (Kauffman, 1993; Stacey, 1995; Pascale, 1999), the literature on dissipative structures places more emphasis on the deep structures of systems that are not apparent when observable structures break down, but that are important to constituting the new order; in a way, this becomes a self-referencing process (MacIntosh and MacLean, 1999; Mitleton-Kelly, 2003). The empirical examples provided in Chapters 6 and 7 could thus be interpreted as a self-referential process in which the existing rules pre-structure the new, emerging properties. There is some evidence to support this interpretation (see Klijn, 2001).

This idea of self-referencing is highlighted even more in autopoiesis theory, which states that systems can regenerate and continuously recreate themselves (Twist and Schaap, 1991; In 't Veld et al., 1991). Systems are thus self-regenerating enclosed structures, whose mechanisms are interconnected and mutually dependent. Autopoiesis envisages a system not just as an open one, as is often done in organizational theory (Burrell and Morgan, 1979; Morgan, 1986), but also as a system that is continually interacting with the environment. However, this "interaction is always determined by an organizationally closed system of production relationships" (Twist and Schaap, 1991: 32). Most examples of these systems come from biology (Maturela and Varela, 1980). This also means that systems have a certain degree of self-containment and closure to their environment. They adapt to their environment but do so with properties and characteristics that are created and sustained in the system itself. In that sense, and from a public administration perspective, closure implies a situation that is 'less governable and less susceptible to incentives'.

### **2.4.2 Ideas of Self-organization and Spontaneous Order in Public Administration**

Although, as has been earlier indicated, public administration originally had a strong focus on goal achievement, vertical steering and the central position of public actors, the last decennia have shown a growing interest

in the complexity of governance processes and self-organization as a phenomenon. The large-scale interest in governance and governance processes proves this. It is interesting to see a few trends in public administration in which self-organization and emergent properties play an important role.

First there is the literature, mentioned earlier, on strategies and game types. This literature comes originally from other disciplinary fields. The literature on strategy is strongly associated with business administration and organization theory, while the literature on games, especially the rational game types, is strongly associated with economics and public choice theory. However, these branches of literature have more and more begun to be imported and utilized in public administration. Scharpf (1997), for instance, uses the rational choice literature to characterize strategy patterns in decision-making for his model which includes both actor variables and structure variables. The game types, such as the prisoner's dilemma and chicken and assurance games, could be considered as emergent strategy patterns that arise out of the strategic behaviour of individual agents without external coordination. These emergent patterns can be analyzed rationally in an attempt to construct ideal types, as Scharpf does, in line with the rational choice and public choice literature, but they can also be interpreted more qualitatively. Crozier's work in analyzing the emergent strategy patterns of the French bureaucracy is an example of this (see Crozier and Friedberg, 1980, for a more theoretical elaboration on the idea of games and structure).

Ideas on emergent properties can also be found in institutional theory and institutional perspectives on public policy, which has received much attention in public administration over the last 20 years. Various theories such as network theory (Hanf and Scharpf, 1978; Marsh and Rhodes, 1992; Kickert et al., 1997), contractual theories (Williamson, 1996; Deakin and Michie, 1997), implementation theories (Hanf and Toonen, 1985) and public policy and management theories in general (Peters, 1999; Pollitt, 2003) have incorporated institutional concepts and theoretical ideas. A lot of these, especially the more sociology flavored versions (see Scott, 1995), stress that institutional structures arise out of interactions between individual agents. They shape or reshape institutional structures with their actions because they follow, use and interpret existing institutional rules. Thus, through the combined action of individual agents in the system, if this idea is presented in terms of complexity theory, new features may emerge that solidify and form the structure of a social system.

There are also ideas about self-organization in public administration that are more attached to the notion of closure that is connected to self-organization. If systems are seen to be self-organizing but also self-regenerating, then they seem to have their own dynamics and are able to react to the environment in their own ways. This means that they are, to a certain extent, closed to outsiders or external pressures (see also Chapter 8 in this book), or that they at least react to those pressures in their own ways. This idea can be found both in the growing literature on frames and

perceptions and in the network literature on the accessibility or closure of networks. The first branch of literature stresses that actors have frames of reference from which they interpret and evaluate information, actions and developments (see Rein and Schön, 1992). This means that actors can share certain frames, but also that frames can be very different, which inhibits interaction, collaboration and common goal achievement. Theories such as Sabatier's advocacy coalitions (Sabatier and Jenkins-Smith, 1993) stress that coalitions of actors can be found that share basic policy beliefs (for similar thoughts, see Benson, 1982). Closure is also emphasized by a section of the network literature, which focuses on policy communities that are characterized by strong interaction ties and dependencies but also by common views, especially in sector policy communities (see the early work of Rhodes, 1988, 1997), but also work by others on networks (Laumann and Knoke, 1987).

### **2.4.3 Self-organization in Complexity Theory and Public Administration**

It is clear that the ideas on self-organization and emergent properties in complexity theory have some resemblance to recent ideas in public administration on frames, closure and on the development of institutional characteristics. On the other hand, at first glance the ideas in complexity theory seem to be more radical than those in public administration. From a complexity theory perspective, it can be argued that self-organizing systems are difficult to govern and/or influence. Notions of closure challenge the idea that systems or agents can be governed by clear signals.

These radical ideas do, however, fit in to the ongoing discussion on governance that plays an important role in modern public administration. The most interesting question then becomes how we can transform the ideas of complexity theory on self-organization in a valuable way that is useful for serious empirical analysis to public administration concepts.

## **2.5 COEVOLUTION: THE MUTUAL INFLUENCE OF SYSTEMS ON ONE ANOTHER**

Complex systems are not only complex in and of themselves but also because they are connected to other complex systems that influence one another. This idea of coevolution is elaborated upon in this section.

### **2.5.1 Coevolution in Complexity Theory**

The idea of connectivity, which is central to complexity theories, does not only apply to elements within one system but also to the relationship between systems. In biology the idea of coevolution essentially is that organisms are related to one another and that adaptation of one organism

to its environment influences not only the entire fitness landscape but also the functioning of other organisms (Kauffman, 1993).

Coevolution can then be described as “the evolution of one domain or entity [that] is partially dependent on the evolution of other related domains or entities, or that one domain or entity changes in the context of the other[s]” (Mitleton-Kelly, 2003: 7; see also Chapters 8 and 9 in this book). ‘Entities’ is a very general term that can refer to individuals, teams, organizations, etc.

Within social systems, coevolution is mainly the result of strategic actions of both agents and collections of agents. The difference is that, in complexity theories, strategies are not seen simply as responses to a changing environment or to another agent, but as adaptive moves that affect both the initiator of the action and all others influenced by them (see Mitleton-Kelly, 2003). Coevolution does not have to be a connected occurrence that happens simultaneously. In most cases it will be a phenomenon that can be observed to occur in shorter or longer adaptations. It is also something that can happen at all levels and scales. Thus, coevolution provides complex systems with the outlook of a large range of multiple intertwined interactions and relationships that influence one another in direct and indirect ways. Coevolution is connected to the idea of feedback, the latter being the precondition for coevolution where the systems really have to change because of that feedback.

## 2.5.2 Notions of Coevolution in Public Administration

The notion of coevolution can be very well applied to the domain of public administration. In fact, most public administration examples may even be far more interesting and well suited to this promising notion than some of the examples in the literature on complexity theory, which are often simple and mechanistic. There are many cases in complex policy processes where the strategic choices of sets of actors in one system or network are influenced, sometimes quite unexpectedly, by sets of strategic choices by other actors. Local infrastructure projects and the decision-making around them are often tied to the national decision-making process, which takes place in completely different and sometimes remote arenas. The idea of different levels or arenas of decision-making that influence one another can be found in various public administration theories (see, for instance, Kiser and Ostrom, 1982)

This can also be found in network theory on decision-making, which stresses that decision-making takes place within networks of actors (Hanf and Scharpf, 1978) but is often tied to decision-making in other networks. In this situation, decision-making in one system may coevolve with decision-making in other systems. This coevolution works both ways. It is of course clear that decision-making on the central level, either in terms of general content decisions or in terms of concrete distribution decisions, influences

decision-making on the local level. However, this analysis can be refined further because at the same time, several decisions about infrastructure are being made in several local systems that influence one another. Thus, decisions made at the local level influence one another by means of central decisions (or the available space to make these decisions). However, coevolution can also occur in the sense that experiences and choices influence one another because of learning processes. In network theory, this is conceptualized as decisions that take place in different arenas that can be situated in the same network but also in different networks (Koppenjan and Klijn, 2004). With the arena concept various subsystems in a system (network) may coevolve with one another or even with other networks. This happens when decisions in one arena influence decisions in a very different arena. The actors in the arenas may be aware of this, but not always, and thus are confronted by strategic decisions somewhere else that they have to cope with.

The notion of coevolution has already been introduced in earlier theories on organization and decision-making. Cohen et al. (1972) have challenged the conventional view of organizations as well-organized rational systems and have suggested that organizations are anarchies where separate streams of solutions, problems and events flow and have to be connected. This “garbage can” image of organization inspired Kingdon (1984) to conceptualize a model of decision-making and agenda formation in which several separate streams can be traced: a stream where problems are constructed and refined, one where solutions are developed and a stream of political events. Decisions are made when couplings are achieved, that is, where an experienced problem is connected to a known solution and is backed by political events that support action. Kingdon calls these couplings ‘policy windows’, which are moments that are favourable for making decisions and coming up with policy. Policy entrepreneurs attempt to promote such moments and to seize the opportunity when policy windows occur, i.e. coevolution between problems and solutions.

Kingdon’s ideas show how coevolution can be conceptualized in public administration terms and can contribute to empirical research and an understanding of complex decision-making. It is also interesting that Kingdon highlights the complexity and unpredictability of processes. Policy windows can result from specific occurrences (such as crises), which can hardly be predicted in advance.

### **2.5.3 The Value of Coevolution for Public Administration**

The notion of coevolution challenges the researcher to look for more complex relations in decision-making than before. In other words, the researcher is forced to elaborate and expand on the existing notions of public administration related to connected arenas or separate streams even further and look for larger patterns of relationships between decisions and developments. The notion of coevolution is thus perhaps the most promising concept in

complexity theory from the perspective of public administration. If it is connected to the idea of fitness landscape, an image can be obtained of the changing environment of an agent as a result of its own actions, other agents' actions and external pressures and coevolution with other systems in which the agent must constantly adapt itself to survive. Given the many stories on the complex life of a manager involved in public administration phenomena, this presents a very interesting image.

On the other hand, there is the question of whether the focus on coevolution makes the researcher's task more difficult because he must cover larger research ground, paying attention to developments in other systems that are connected to the system he is researching. A closer comparison between the ideas of coevolution in complexity theory and public administration and some attempts at empirical applications provide insight into the possibilities as well as the limitations of research in coevolution.

## **2.6 THE ROLE OF THE MANAGER: COPING WITH COMPLEXITY**

What do the insights gained from complexity theory mean for ideas about management or public management? In order to answer this question, the current dominant view on management in public administration is discussed. Some ideas on management are then suggested in keeping with the line of reasoning of complexity theory and these two theoretical frameworks are then compared and contrasted with each other.

### **2.6.1 Dominant Views on Management in Public Administration**

Two dominant perspectives on (public) management have evolved in the last decade: the New Public Management (NPM) and Governance. The first perspective strongly emphasizes a separation of responsibilities and authority with regard to policy and implementation and with regard to political decisions and their ultimate realisation. The second focuses on improving inter-organizational coordination in order to come up with better policy proposals and implementation and tie important actors to the policy process.

Although no definitive image of the NPM exists, in general the NPM can be characterized by a number of features that are connected to one another but that do not necessarily have to all be present at the same time (see Politt, 1990; Hood, 1991; Kickert et al., 1997; Kettl, 2005; Lane, 2000):

1. a strong focus on improving the effectiveness and efficiency of government performance
2. a strong focus on ideas and techniques that have proven their value in the private sector

3. a strong focus on the use of privatisation and contracting out of governmental services, or (parts of) governmental bodies to improve effectiveness and efficiency
4. a strong focus on the creation or use of markets or semi-market mechanisms, or at least on increasing competition in service provision and realising public policy
5. a strong interest in the use of performance indicators or other mechanisms to specify the desired output of the privatised or automatised part of the government or service that has been contracted out.

With notions like privatisation, contracting out and agencies as separate executing bodies (see Pollitt et al., 2001), NPM reforms seek different demarcations in relations between the private and public spheres. Through vehicles such as contracting out and privatisation, they not only create a different relationship between the public and private sector but also attempt to disentangle the complex responsibilities that were created during the evolution of the welfare state.

The Governance perspective on management focuses on horizontal coordination, and attempts to cope with complex interdependencies by improving inter-organizational coordination and management. The most important elements of the governance response to uncertainty are:

1. An emphasis on horizontal types of steering that are presumably better able to receive cooperation from societal actors. These horizontal types of steering supposedly ensure that actors will use their veto power less frequently (*enhance support*).
2. An emphasis on the better use of knowledge gained from societal actors in order to improve the quality of policy and public services (*quality improvement*). Private actors often have inside knowledge of the market, and societal organizations have inside knowledge of preferences (among users of services, or citizens in large projects) of societal trends and sector knowledge (consider, for example, knowledge of the development of demand in medical care, opportunities for coordination, etc.).
3. An emphasis on the early involvement of societal actors so that the legitimacy of decisions is enhanced (*enhancing legitimacy*). Frequently, governance reform proposals are linked to improving, or bringing innovation to, the democratic process, or at least to the ambition to re-establish the link between politics and the citizenry.
4. Strategic and knowledge uncertainties in decision-making processes can be dealt with by involving actors early in the decision-making track and by tapping into the different knowledge sources of actors in order to arrive at a shared vision (*enhancing quality and innovative capability*).



Just as with the NPM response, the Governance response is often linked to ambitious plans for improving the functioning and organization of the public sector. Emphasis is placed on strengthening inter-organizational cooperation, the increased involvement of citizens and the private sector in decision-making and strengthening the integral character of decision-making. The assumption is that better results can be achieved as a result. The Governance response often includes methods for increasing citizens' involvement in decision-making or assessing public services and large projects as well as other policy initiatives through methods such as citizen panels, types of interactive decision-making and citizen consultations (Klijn and Koppenjan, 2000; Lowndes et al., 2001; McLaverty, 2003; Denters et al., 2003).

These two dominant perspectives on management treat complexity quite differently. The NPM attempts to dismiss or reduce complexity by abstaining from detailed governance, and focuses instead on governing by output criteria and organizing the playing field (market mechanism, privatisation, etc.). Here, the manager tries to keep as far away as possible from the complex realities of the interaction system itself. It treats the system as a black box and reacts to the emerging characteristics of the system by changing the output criteria.

The Governance perspective, on the other hand, attempts to address complexity by stepping into the complex system and designing governing mechanisms and strategies that specifically target the situation and characteristics of the process. It is a perspective that acknowledges the dynamism of the processes as well as the fact that systems show emergent properties, but posits that these can be addressed by becoming part of the interaction system, influencing the strategies and choices of the agents and coordinating the interactions between agents.

## 2.6.2 Management Ideas from a Complexity Theory Perspective

Although various authors have made statements about management or management strategies from a complexity point of view, it is striking that almost no well-developed concepts and ways of steering have been conceptualized. There are generally three main perspectives based on complexity theory.

The first perspective is that the idea of complexity itself and the notion of emergent properties lead to the conclusion that complex systems are *hardly manageable or not manageable* at all. If they are at all manageable, this could only be through simple and abrupt disturbances (Schaap, 1997). If the autopoiesis ideas are singled out in the theory of complex systems, this is probably the conclusion that would be arrived at. Since systems only react according to their own internal dispositions to external pressure, governing these systems is extremely difficult if not impossible—many of the cases in this book testify to this. At first glance, this has some resemblance to NPM because in this perspective, the governing interventions are largely

provided from outside the system. However, upon closer observation, the two ideas have less in common. Where the NPM has strong expectations of the management interventions that are proposed, this is not so from a radical complexity theory perspective.

A more relaxed version of the first would be to accept that systems are manageable only if management “goes with the flow”. Flood (1999b) refers to this as ‘managing the unmanageable’. In this version of the unmanageability perspective, the idea is that dynamics, self-organization and emergence are the norm and that adjustment to these changes is the best solution to maintain some influence. The manager adopts, rather than attempts to steer, developments. Of course, both versions of the first perspective would be almost impossible to accept by the media and politicians.

The second perspective for management from complexity theory could point at something such as ‘smart interventions’. If complex systems are unpredictable and display emergent properties, than specific knowledge of each unique situation is required. Interventions should be very specifically aimed at characteristics of the system and try to establish specific interactions between agents that realise interaction patterns and/or the outcomes that are headed in the desired direction. In this view of management, the manager is not only part of the complex system he is managing but also engages in interactions with the separate agents to influence interaction patterns and outcomes. This view follows pretty closely the literature on network and process management (Kickert et al., 1997).

The third perspective that comes from complexity theories is the view of management as ‘riding the fitness landscape’. If the events in a social system are viewed as a range of opportunities where some choices and events are more likely to occur than others (the fitness landscape), then the task of the manager is to be aware of the opportunities in that landscape and use them to realise interesting policy proposals, or to alter proposals and actor coalitions in such a way that they fit the landscape. This image of the manager and his task and strategies of course resembles a little the notion of a policy entrepreneur in Kingdon’s stream model. A policy entrepreneur is someone who tries to make connections between the different streams (problems, solutions and choice opportunities) or uses them to promote policy proposals. The commonality between this perspective and the previous one is that in both cases the manager must have a very good understanding of the system in which he participates in order to take advantage of it. Chapters 10 and 11 delve deeper into the complexity of public management and governance.

## **2.7 CONCLUSION: THE ADDED VALUE OF COMPLEXITY THEORY**

The ideas and concepts from complexity theory have been shown to be more in line with the development of public administration theories than the scarce use of ideas, based on complexity theories, in public administration would

have led us to believe. Many of the ideas and concepts of complexity theory fit rather well into contemporary ideas about complex decision-making, complexity in strategies and processes and emergent characteristics of processes and institutions in public administration theory. Some ideas are relatively new to public administration (such as coevolution, non-linearity and the metaphor of the fitness landscape) or are more radical than comparable concepts in public administration. Other concepts are fairly similar to those that already exist in the field of public administration (such as non-linear dynamics and feedback). In this sense, the ideas of complexity theory could be regarded as follow-up ideas that arise as a result of earlier theories and problems experienced in public administration

This does not mean, however, that the concepts borrowed from complexity theories are useful for all public administration phenomena, or that they are without problems. The conceptual framework of complexity theories is suitable for wicked problems. In this sense it is a conceptual approach that resembles governance theories, network theories and other theories that focus on analyzing complex processes and problems. Much work remains to be done to empirically operationalize the concepts and their applications to empirical phenomena. This book is a valuable attempt to do so.

## NOTES

1. “The attempt to push categorization as far as possible and to find general propositions which can be applied to specific situations is what I refer to with the word ‘theory’” (Lindblom 1959: 89).
2. This might be a consequence of Easton’s key interest in how political systems manage not to succumb, despite the pressures put on them (1965: 17).

# 3 Approaches to Researching Complexity in Public Management

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## 3.1 INTRODUCTION

Complexity research is characterized by plurality in research methodologies (see e.g. Eve et al., 1997; Middleton-Kelly, 2003). This chapter discusses methodologies and guidelines suitable for researching complexity in public administration. As relatively little has been specifically written on research methodologies in public administration, general insights in complexity theory and social science methodology will be drawn upon. Apart from that, methodological insights gained from the research carried out by the authors of this book are built upon.

Methodological approaches to the study of complexity have to deal with complex causation. Complex systems are dynamic and open, exhibit emergent properties and have the potential for qualitative transformation. Outcomes depend on multiple causes and these causes interact in an unpredictable manner, which leads to non-linear behaviour and self-organizing effects in different directions (Byrne, 1998: 20).

Amidst a multitude of methodological approaches in complexity research, a major distinction between general and situated approaches to complexity can be made. This distinction is inspired by Byrne's (2005) distinction between simplistic (general) and complex (situated) complexity.<sup>1</sup> As Bar-Yam (1997) puts it, methodology for complex systems can either focus on simple rules in a class of systems or on the specific character of a certain complex system, although it will be argued here that it may be possible to make a systematic comparison across systems as a way of exploring situated complexity. General complexity assumes a general set of rules from which emergent complexity flows. In this approach, research aims to establish the (relatively simple) rules and patterns of order that can be discovered in seemingly complex systems (see e.g. Eve et al., 1997; Holland, 1998).

Situated complexity starts from the premise that reality is deeply complex and inherently contingent. Linked to the contingency of the world is the idea that systems do not operate according to general rules applied in all contexts. They cannot be fully understood on the basis of general rules. "Explanation is possible, but only explanation that is local in time and

place” (Byrne, 2005: 97). Research into situated complexity is often carried out through case-based empirical investigations, in order to explore complex causation and trajectories (paths of development through time) in and between complex cases (Byrne, 2005). Modern developments of Mill’s methods of similarity and difference (Mill, 2002) can be used to explore change, but such an examination must be founded on the in-depth examination of individual cases.

General complexity and situated complexity have in common that they both deal with the understanding and construction of patterns. These patterns may be deeply complex, characterized by complex and contingent causes, but they may also be simpler, featuring, for example, linear causal links. They may be heavy patterns that are persistent, distinct and easy to recover, but they may also be light patterns that are hard to find as they are more discontinuous, oscillating between emergence and disappearance. It must be added, however, that the central aim of general complexity is explicitly the understanding of patterns, while situated complexity pays attention to both idiosyncratic events as well as events that are part of a pattern.

This chapter discusses the two approaches of general complexity and situated complexity, and explains how these approaches can be combined into a logical whole of research methods, providing a methodology for public administration research. The argument is that both the approaches of general and situated complexity may contribute to furthering an understanding of complexity.

Although there are tensions between these two approaches, it is thought that fruitful combinations between them have to be found in order to obtain a deeper and more general understanding of complexity in public administration. Dealing with complexity requires double-think. The challenge for complexity researchers is to arrive at an understanding of pluriform patterns through a combination of an in-depth understanding of cases with a broad understanding of general patterns in social systems.

Until now in the social sciences, complexity theory has mostly been applied from a general complexity approach or by exploring metaphorical parallels (Byrne, 2005; Dobuzinskis, 2006). In general complexity studies, it is often argued that theories on complex systems are universal for natural, biological and social systems and that it is possible to map generic

*Table 3.1* Key Differences between General and Situated Complexity

	<i>General complexity</i>	<i>Situated complexity</i>
Main assumption	Complex systems can be described with a few rules.	Complex systems are characterized by emergence beyond rule-following.
Validity of rules	General	Context-dependent
Focus of approach	Rules and patterns	Patterns and idiosyncratic events

behaviour among these different areas of study (see e.g. Kauffman, 1993: 403–404; Bar-Yam, 1997: xi). However, the application of complexity theory to the social sciences should not be a matter of simply importing terminology and ideas from the hard sciences (Cilliers, 1998; Byrne, 2005). The social sciences dealing with complexity need to move beyond metaphorical parallels with the natural sciences. Social systems differ from natural systems in terms of the (self-)conscious actions of actors, reflexivity, invention and planning. These characteristics of social systems have consequences for the methodologies of research on social systems. The social sciences must delve into (self-conscious) meaning-making by actors. What continues to be lacking in the social sciences “are empirical studies using these new concepts and techniques as means to describe or evaluate the effects of actual programs or institutional arrangements” (Dobuzinskis, 2006: 583).

This book attempts to rise to this challenge with situated complexity approaches through case studies aiming at detailed and contextual knowledge. Thus, an in-depth understanding of particular cases is required. At the same time, a more general understanding of complex systems and public management is aimed at through a search for general patterns. These general patterns are derived from a comparison of cases. The research methodology that consists of a combination of case-based approaches and comparative approaches can be visualised as a T-structure, the vertical ‘leg’ of the T being in-depth case studies and the horizontal ‘roof’ being comparative approaches aimed at conclusions valid in a broader environment.

### **3.1.1 Outline**

Section 3.2 will describe the two main paradigms that underlie the multitude of research methodologies in complexity research, namely the positivist and postpositivist paradigms. In addition, the authors’ position in this debate as critical realists is explained. Section 3.3 deals with the methodologies applied in this book. It focuses on the methodological issues the researchers encountered and how these were dealt with. On the basis of the empirical research carried out for the purposes of this book, incorporating complexity theory and methodological theory, methodological guidelines will be drawn up in Section 3.4. Finally, Section 3.5 summarizes the main conclusion of this chapter.

## **3.2 POSITIVISM AND POSTPOSITIVISM**

There has been an elaborate debate on meta-theoretical positions of complexity science (see e.g. Cilliers, 1998, 2005; Eve et al., 1997; Morçöl, 2001), with two main possible standpoints, namely positivist and postpositivist. This section sketches out the main thrust of the debate and outlines the

authors' own position as a critical realist position which is neither entirely positivist nor fully postpositivist.

The positivist standpoint assumes a reality that exists independently of the knowing subject. Positivism is characterized by a realist ontology (Guba, 1990; Lincoln and Guba, 2000). Positivists aim to discover general (universal) laws explaining reality. These laws are to be established through scientific methodology, based on the observation of reality (facts) and deductive reasoning. Positivists hold that the nature of reality is deterministic and that causality is linear. Furthermore, positivism is reductionist; reality consists of discrete elements or events that "can be broken down to its parts, which in turn can be isolated and analysed to determine the relationship between them" (Morçöl, 2001: 109).

Particular strands of positivism have developed within complexity theory, starting from the ontological assumption that the world is inherently complex due to the fact that it consists of many components which are related to one another in various ways. An important strand of positivist complexity theory rejects the idea of universal laws that would apply always and everywhere, but it "accepts that contextual and local generalizations can still be made" (Morçöl, 2001: 106). Further, within complexity science it is assumed that cause-and-effect relationships may be both linear and non-linear. The idea of emergence (out of self-organization and coevolution) is also present within this standpoint, which means that reality cannot always be reduced to discrete components. Most research that takes on a general complexity approach fits within this paradigm. General complexity focuses on the establishment of a general set of rules from which emergent complexity flows.

John Holland's work (Holland, 1995) is seen as a canonical text for this approach. Although Holland acknowledges that it is impossible to develop a record of rules to predict all possible situations, he assumes that it is possible to acquire experience by decomposing complex situations in parts (building blocks). Through the use and re-use of these parts in a variety of different combinations, they become building blocks for experience. In this way, Holland argues that if we build up enough experience and learn to know all the blocks and how they can be combined, reality can then be known. In general complexity, the future states of systems cannot be predicted on the basis of the knowledge of laws and the initial conditions of the system, but the range of action of components of the system can be defined (Byrne, 2005: 102). Although it does deal with a kind of complex emergence, it remains in a sense reductionist as it seeks to reduce reality to particular sets of rules. This approach recognises that the interactions between the parts of a system, and not just the parts themselves, are essential to understanding it. The behaviour of a complex system is determined by many possible factors. General complexity studies often use dynamic models to research possible effects of local details on the behaviour of a system on a larger scale. Computer simulations are often considered to be the ideal device for keeping complexity manageable. General complexity

studies differ from simple systems research, which assumes that a system is essentially uniform and ignores the effects of local details on the behaviour of a system on a larger scale. Simple models assume that knowledge of general laws and the initial conditions of the system allow for predicting future states of the system (Byrne, 2005: 102).

Within the postpositivist standpoint, different strands can be distinguished, varying from extremely relativist strands to forms of social constructivism that acknowledge that some knowledge is more valid than other knowledge. Relativist strands such as perspectivism argue that there is no reality outside perceived reality. Relativism holds that not only is it impossible to provide objective accounts of reality because every account of reality is based on subjective perceptions, but it also argues that there is no better or worse account of reality to be known. All descriptions of reality reflect particular perceptions of it and there is no way to stand apart from any description of reality and judge which description is best.

Within complexity theory, positivists and postpositivists share a number of important ontological assumptions (notwithstanding the sometimes fierce debates that rage between them). Both paradigms hold that complexity of the world arises from its many components being related to one another in multiple ways, and that the world is dynamic and only temporarily at equilibrium. Further, both hold that processes may unfold in either linear or non-linear ways, and that emergence plays an important role (see Chapters 1 and 2 of this book, but also Cilliers, 2005; Cooksey, 2001; Morçöl, 2001). One of the main differences between positivist and postpositivist complexity theory seems to be the importance of contingency. Positivists place greater emphasis on rules and patterns than postpositivists, who stress contingency and randomness, due to the role of reflexivity. Thus, situated complexity fits well into the postpositivist paradigm, as it assumes that reality is deeply contingent.

There are major epistemological differences between positivist and postpositivist approaches to complexity. Positivists claim that scientific knowledge is universally valid, while postpositivists argue that all knowledge is locally valid. The latter argue that “more than one description of a complex system is possible” and that “the knowledge gained by any description is always relative to the perspective from which the description was made” (Cilliers, 2005: 257–258). This implies that according to postpositivists, knowledge is heterogeneous (Gibbons et al., 1994).

Positivists hold that scientific knowledge does not depend on the observer; i.e. scientific knowledge is not subjective but objective. Positivists and postpositivists agree that complex systems can only be understood through the reduction of complexity. Cilliers (2005: 258–259) states that “we cannot have complete knowledge of complex systems; we can only have knowledge in terms of a certain framework”. However, positivists hold the view that reduction can be realised through an objective and detached scientific method, while postpositivists argue that using a framework necessarily



involves choosing a standpoint, implying the impossibility of objectivity. Postpositivists state that “knowledge is provisional. We cannot make purely objective and final claims about our complex world” (Cilliers, 2005: 259). We have to interpret, use frameworks, make choices, and therefore Cilliers (2005: 259) argues “we cannot escape the normative or ethical domain.”

The ontological assumption of the complex nature of the world does not necessitate a postpositivist approach, nor does it necessitate a positivist approach. It may be true that, given the overwhelming complexity of the world, there is no human way of obtaining full knowledge of the world. The complexity of the world must therefore be reduced, as Cilliers (2005) has convincingly argued. However, such reduction can be carried out through positivist, detached methods assuming objectivity, and through postpositivist methods in which the research deliberately takes a standpoint and clarifies its non-neutral position.

### **3.2.1 The Ontological and Epistemological Stance in this Book**

Most of the authors in this book take a position that is neither fully positivist nor fully postpositivist. Their standpoint generally leans close to a strand of critical realism. Critical realists assume that a reality exists independent of the knowing subject (see e.g. Guba, 1990; Lincoln and Guba, 2000) and their ontology is positivist. Most of the authors in this book have sought a balance between an ontology that stresses only contingency and randomness on the one hand and one that stresses regularities and patterns in policy processes and public management on the other. The contingency of the world precludes universal claims, while at the same time generalisation is possible when regularities over different localities are found. Therefore, modest forms of generalisation are applied (see Sections 3.3 and 3.4) within cases as well as between cases. Most of the authors in this book strive for generalisation while recognising that this can only be done to a limited degree.

The epistemological position taken in this book corresponds to the critical realist stream that argues that perception of reality involves interpretation. In other words, reality can only be perceived through particular interpretive frames. This perspective stresses that knowledge of the world is actively constructed in our minds rather than, as some variants of critical realism argue, passively received or imprinted on the mind (cf. Schwandt, 2000). Actors construct their interpretations in a particular social context, influenced by practices, language, ambitions, cultural values, etc. What is opposed is the “naïve realist and empiricist epistemology that holds that there can be some kind of unmediated, direct grasp of the empirical world and that knowledge (i.e. the mind) simply reflects or mirrors what is ‘out there’” (Schwandt, 2000: 197). It is important to realise that, in general, this does not mean that the authors in this book dismiss the idea of ‘knowing the world’ but rather that they insist on a careful reflexive engagement

with the process of constructing knowledge. In keeping with Pawson and Tilley (1997: 21), they accept the need for reflexivity in hermeneutic interpretation as a means towards truth but do not by extension endorse the extreme reflexivity of any approach that “starts from the point of view that all beliefs are ‘constructions’ *but* adds the twist that we cannot, therefore, get beyond constructions” (original emphasis). Realists argue that knowledge can be formed but that all aspects of that formation must be subject to critical reflection.

In terms of objectivity, the authors in this book do not hold that their research provides an objective account of reality. In the end, every account comes into being through a particular framework. At the same time, several authors strive for their accounts not to be solely subjective. They do so by trying to get at accounts which are intersubjectively accepted by their respondents.

### **3.3 METHODOLOGIES AND METHODS APPLIED IN THIS BOOK**

This section goes into the methodology and methods applied in the research in this book. The methodology that aims to combine insights from research into general complexity and situated complexity will be laid out. Before doing so, however, two important features of the methodology will be dealt with: namely, a combination of different approaches and methods and attention to pluriform patterns.

#### **3.3.1 Combining Approaches and Methods**

The methodology applied in this book combines case-based approaches with comparative approaches. It can be understood as a T-structure, with the leg of the T being in-depth case studies and the horizontal ‘roof’ of the T being comparative methods aiming at conclusions valid in a broader context. Within this methodology, research may begin from the micro-level and then be extended to the macro-level, or vice versa. In the first case, the researcher analyzes a phenomenon in detail and then begins to research whether the phenomenon is part of a wider pattern, while in the second the researcher would first establish a general pattern and then attempt to disentangle the detailed workings of the phenomena within the pattern.

Behind the stance of combining different methods lies the experience that different methods are suitable for researching different aspects of reality. Pluriformity in patterns requires pluriformity in research methods, and “simultaneous or sequential triangulation of more than one method” (Morse and Chung, 2003: 9).

This is not to say that anything goes. Particular research questions, practical possibilities in the field, such as access to research subjects and the

specific situation with regard to the amount of time and money available, make particular research methods suitable or unsuitable. For example, case studies are suitable for answering ‘why’ questions but less suitable for answering ‘how much’ questions.

In this book, a combination of several methods is conducted in three ways:

- by switching researchers (with different theoretical backgrounds and preoccupations)
- by switching between methods for data collection (in-depth interviews through narrative interviews or active interviewing, short informal interviews, participating in or observing social processes, document analysis, etc.)
- by switching the focus of analysis (from interrelated system elements to the system as a whole and its relationship with the system environment)

The use of a combination of methods represents an attempt to create variety with regard to the distance vis-à-vis the research subject as well as the scale of research (micro-macro). At a distance and at the macro-level, the aim is to construct patterns of general complexity. This aspect of the research is geared towards generalisation, aiming to provide insight into general patterns that reach beyond the idiosyncrasies of the individual case. In most of the chapters, generalisation is realised through approaches aimed at pattern building within and between cases.

Attempts are made to understand situated complexity by researching patterns at the micro-level. The research into situated complexity aims for an in-depth understanding of particular systems through mainly case-based research. This part of the research leads to detailed and context-bound knowledge of cases as a whole: complex patterns within cases as well as details of patterns within multiple cases.

A form of dual thinking is applied by combining case studies with comparative methods. Insights arising from general and situated complexity are combined in such a way as to attempt to combine an understanding of idiosyncratic (singular) events in a particular context with an understanding of patterns in a wider context. Through the research process, attempts are made to determine in what ways and to what extent generalisations can be made. In other words, interpretations and interactions are searched out in a specific context, while attempting to break loose from these specific, culturally defined insights.

### 3.3.2 Case-based Methods to Research Situated Complexity

The methodology applied in this book to research situated complexity is based on ideas from case study methodology. Case-based studies can

be taken as a starting point since they seem more appropriate for exploring complex causation and trajectories in a specific context. Case study research aims at achieving an understanding of one or more cases of a phenomenon in their natural context (cf. Yin, 1984). Detailed knowledge about a social phenomenon can be obtained by following the phenomenon in its own environment during a certain period of time. Case studies are useful for approaching a phenomenon (such as a social system) as a whole. Case studies can be useful in complexity research because they provide the opportunity to research an entire social system and all of its elements as a coherent whole (see e.g. Flood, 1999b). Further, it provides the opportunity to study the case in detail, which is useful when attempting to understand the full complexity of a case.

In situated complexity research, it is assumed that a case and its context are strongly interrelated. Extended case studies can be useful for this kind of research (Van Velsen, 1967; see also Burawoy et al., 1991). Here, events and concerns that at first belong to the context of the case become embedded in the case study if they appear to influence the case's development. Another useful approach is Vayda's progressive contextualization approach (Vayda, 1983). This is in keeping with the idea of judgment introduced by Flood (1999b). The boundaries of the 'object' under study will be adjusted when the behaviour of actors outside the case appears to become relevant during the research. We distinguish between first order boundary judgments made by respondents and second order boundary judgments made by the researchers.

### **3.3.3 Comparative Methods to Research General Complexity: Generalisation and Patterns**

Along with situated complexity, this book studies general complexity as well. Comparisons are made across cases in order to arrive at generalisations and discover patterns beyond individual cases.

In each chapter, authors search for patterns by applying comparative methods or techniques (next to the methods aimed at understanding general complexity). Three methods have been used to recognise patterns and move beyond singular events and opinions. Firstly, sufficient research data is collected among respondents to be able to recognise patterns in how they perceive phenomena. Secondly, different episodes within the same case are compared to see whether the same pattern occurs over time. Thirdly, different cases are compared to search for patterns that occur beyond single cases. In line with Ragin's *Qualitative Comparative Analyses* (1987, 2000), the researchers do not attempt so much to compare (single) variables as configurations of case attributes. This allows for the specification of complex and contingent causes (because it does not centre on isolating variables), which are however not unique, but may in fact be shared across a number of cases. This allows the researcher to develop knowledge beyond the detailed ideographic description of unique instances.

In the final chapter of this book, conclusions are drawn at a general level on the basis of comparisons that go beyond individual cases and beyond single chapters. It is here that all cases are utilized and compared to draw general conclusions.

### 3.3.4 Researching Non-linear Dynamics

Both chapters in this book that focus on complex dynamics (Chapters 4 and 5) make use of case studies. They research characteristics of non-linear dynamics and reconstruct the evolution of decision-making processes in time. The cases in Chapter 4 focus on decision making for two major railway lines, namely the West Coast Main Line in the UK and the Betuweroute in the Netherlands, while the cases in Chapter 5 are about progress at the system level of the ports of Rotterdam and Hamburg,

To understand the situated complexity of the cases, the researchers analyzed the evolution of influential events in detail. They focused on change events; i.e. events that seem to be insignificant but actually have disproportional effects. Because change events are unpredictable in their very nature, their evolution and workings were researched afterwards while the research focus switched between the context and case. The authors have traced the origin and effects of change events through interviews and document analyses. They have reconstructed the significance of change events together with interviewees.

Especially in Chapter 4, the researchers pay a lot of attention to developments in the context of the processes they study, because the context of the cases appears to influence the case dynamics in important ways. For example, the British national policies geared at privatisation appeared to influence decision-making in the West Coast Main Line project. The relevance of developments in the context was analyzed through accounts of the actors involved. The researchers made an important methodological decision not to define system boundaries too narrowly prior to their study. They also regarded this boundary definition not as a rigid judgment but rather as a flexible one. Chapters 4 and 5 show how methodological attention to context reveals how events that often appear outside a case are in fact important for understanding the case's complex dynamics.

While studying important events in detail, the researchers also wanted to get a general understanding of their cases and find patterns occurring in all their cases. In other words, they also paid attention to general complexity.

In Chapter 4, the authors embark upon a tentative verification of the theory introduced in Chapter 1 that complex dynamics spring from (a) initial conditions, (b) multiplicity in the contexts in which projects are implemented and (c) change events during the process of implementation. Based on interviews and document analyses, they find these sources of dynamics several times in both cases, and conclude that the pattern of dynamic evolution is a common path of implementation in complex process systems.

In Chapter 5, case change events are studied in six arenas within two cases. The arenas are regarded as representative of the generic development of the port systems, as the authors retrieved them from document analyses and interviews. Therefore, change events occurring in these arenas can be generalised to the level of the port system. If change events occur in both port systems, a tentative generalisation can be made about the development of port systems. The occurrence of change events impacts the trajectory of the port systems as cases—they render new situations possible or impossible.

### **3.3.5 Researching Self-organization**

Chapters 6 and 7 of this book delve into the theme of self-organization. These chapters both use the case-based approach, although the methodologies differ in terms of their data collection method and levels of analysis.

The researchers use a theoretical framework centred on the distinction between ‘conservative’ and ‘dissipative’ forms of self-organization. Conservative forms of self-organization appear to stabilize and sometimes intensify boundary judgments in social settings, whereas dissipative forms appear to be boundary breaking. Researchers analyze whether these patterns of self-organization can be found in practice and how they affect complex systems. They apply observations, interviews and document analysis to arrive at a multiple-actor perspective of patterns in self-organization. Several methodological issues come up during the course of the research.

The first issue is that boundaries between systems can be blurred, so boundary judgments are difficult to make. In a case of dissipative/adaptive self-organization, it can be difficult to distinguish the ‘self’. For example, it is difficult to decide whether an emergent network behaves as several interacting elements or as a self-organizing entity. The authors of Chapter 6 deal with this issue by defining the system in the way that was generally accepted by most actors within the self-organizing system. These first order boundary judgments frame the activities of actors in complex process systems and result in dispersed decision-making (Chapter 6). In Chapter 7, the research emphasizes the multiplicity of perspectives on self-organization instead of trying to describe it in the way accepted by most actors.

Emergence in self-organization is difficult to research because it refers to phenomena that do not spring from one authoritative (imposing) actor. This is dealt with by paying attention to local and regional governance initiatives that emerge beyond the steering efforts of the national government (see Chapters 6 and 7) as well as by interviewing actors outside any government who do play an important role in the emergence of these initiatives. In both chapters the authors vary on several occasions in terms of their level of analysis. The authors of Chapter 6 discuss the governance system of Randstad Holland by analyzing developments at a project level, regional collaboration and structure revision at the Randstad level. In Chapter 7 the evolution of traffic management as well as shared space in the Haren town are analyzed.

### 3.3.6 Researching Coevolution

Chapters 8 and 9 discuss the concept of coevolution. Chapter 8 deals with decision-making around the Unterelbe estuary in Germany and the Westerschelde estuary in the Netherlands and Belgium. Chapter 9 focuses on coevolution within decision-making for the Gouwe Wiericke polder in the lowlands near the Dutch city of Gouda. Both chapters conduct a longitudinal case study research since coevolution only becomes visible through constant observation over a long period of time. Single snapshots are not sufficient because of the punctuated, oscillating nature of coevolution. Coevolution does not occur in an orderly manner over time. Instead, phases of stability alternate with phases of instability in an unpredictable manner. Multiple snapshots at different points in time do not necessarily converge with the punctuated change of processes of coevolution. Observers, then, run the risk of missing one or some essential determining events in the process of coevolution. Therefore a more continuous longitudinal case study research is required. Continuity in data collection involves extensive research and the collection of much data in order to cover the case and avoid being faced with issues that cannot be explained afterwards because of a lack of data. This laborious approach allows for only a small number of cases, i.e. it fits into the vertical 'leg' of the T-structure described earlier in this chapter.

In the chapter on the Westerschelde and Unterelbe, the researchers were required to find a methodology that would fit their research on the coevolution between a physical system, a social system and a policy action system. They used existing quantitative data together with qualitative data they gathered themselves. Decision-making over physical systems is often driven by quantitative data that are interpreted and acted upon. Interviews were utilized to ask actors about their interpretation of this data and their acting in consideration of this information—this is where positivist research meets postpositivist research, as discussed earlier in this chapter. The authors show how developments in the physical system result in adaptations in the policy action system and the societal environment. This forms the basis of finding local patterns of reciprocal selection between physical and social systems that lie at the heart of coevolution.

In Chapter 9, coevolution is studied in the context of policy processes. It describes the feedback between elements of decision-making: ambitions, frames and facts, and also sheds light on the coevolutionary interaction between different policy processes. In doing so it applies both a case study approach as well as a context analysis in which the researchers continuously switch their research focus to adapt to the process dynamics in the decision-making process.

### 3.3.7 Public Management

The final empirically based chapters in this book focus on the behaviour and actions of public managers. The chapters are largely based on secondary data analysis, which means that data that were collected in earlier



research are now reinterpreted in the context of a new theoretical perspective, in this case a complexity theory perspective.

In order to identify general patterns and arrive at an understanding of general complexity, a comparison was made between two or more cases that had not been compared before. Thus, new differences and commonalities between cases were discovered and previously unrecognised patterns became apparent.

The complexity of public management was researched by focusing on the question of what public managers do in specific situations. This means that apart from trying to establish more general patterns of management activities and strategies, a few interesting situations were analyzed and described in more detail. For example, in Chapter 11 the authors describe interactions that take place between representatives of governmental organizations and other actors in the specific setting of mutual distrust combined with the growing awareness that cooperation was required. Besides the actual interaction, they also paid attention to the setting in which the interaction was shaped.

In Chapter 10, the authors looked for patterns of combinations of management styles within complex spatial decision-making processes. They found that it was possible to generalise their findings based on three in-depth case studies but also pointed out that context-specific differences or various initial conditions could make a huge difference.

### 3.4 METHODOLOGICAL GUIDELINES

Drawing on complexity theory (see Chapter 1) and empirical complexity research carried out for this book (see Chapters 4–13), a number of methodological guidelines can be identified. In a complex world it is impossible to come up with an exhaustive list of methodological guidelines, but the following will provide a set of valuable guidelines for those studying complexity. A distinction has been made between basic guidelines and guidelines that are *particularly* useful for researching complex dynamics, coevolution and self-organization. This does not mean that the respective guidelines are *only* useful for only these separate concepts, however; they may be also useful for researching different aspects of complex systems.

#### 3.4.1 Basic Guidelines

##### *Context is Crucial*

Byrne (1998) argues that when and where things happen is central to how they happen. Knowledge is both historically and geographically specific. It is possible to compare different cases, but the context should always be taken into account (Byrne, 1998). Nevertheless, Cilliers (1998: 55) refers to Derrida to demonstrate that context is not provided objectively and is never absolutely determinable. What is system and what is context is itself the



outcome of interpretation. In the daily practices of public administration, actors often purposefully define things as context or as part of their system (cf. Wagenaar, 2004). For example, if actors do not want to be responsible for something they may attempt to define it as context. Similarly, Cilliers (2005) argues that meaning and knowledge of complex systems are always contingent and contextual, so context always has to be interpreted.

By combining his own expert judgment about the boundaries of a process system and the boundary judgments of his respondents, a researcher can make a deliberate attempt to define both the system he researches as well as its (multiple) context.

### *Modesty*

For researchers who believe that knowledge of complex systems is partial and provisional (an epistemological assumption underlying complexity theory), an important guideline is modesty in claims. This implies being “careful about the reach of the claims being made and of the constraints that make these claims possible” (Cilliers, 2005: 256). Claims cannot be puffed up “with hegemonic pretensions” (Law, 1994: 14).

Giddens argues that “causal mechanisms in social scientific generalizations depend upon actors’ reasons, in the context of a ‘mesh’ of intended and unintended consequences of action”. Therefore, he argues, “generalizations do not have a universal form. For the content of agents’ knowledgeability, the question of how ‘situated’ it is and the validity of the propositional content of that knowledge—all these will influence the circumstances in which those generalizations hold” (Giddens, 1984: 345).

Modesty is as important in complexity theory as any generalisation, and this may be one of the rare generalisations that can be made in accordance with complexity theory, holding true only until further notice.

At the same time this point also calls for laborious and thorough empirical investigation. To say anything valuable about complex systems and their workings requires both a large amount of detail and a thorough understanding of the contexts.

### *Switching of Approaches and Methods*

Starting from the idea that both general and situated approaches to complexity are valuable and insightful, one basic guideline is to apply multiple research methods in such a way that insight is obtained in general patterns and situated phenomena in their full complexity. One way of doing this is by combining in-depth case studies and comparative methods (see Section 3.3). What is crucial when combining these methods is to regularly switch the focus of analysis and the level of abstraction. Patterns of general complexity can be constructed at the distance of the macro-level. Switching to the micro-level provides insight into locally emerging events or patterns.

Of particular significance is the temporal ordering of approaches. Where large quantitative data sets are available, general complexity methodology can be employed to establish rules that imply typologies of cases and typologies of trajectories of change over time. These approaches can then be followed by intensive situated investigation of representative examples of the ‘classes’ identified in the quantitative phase. The other way around research based on situated complexity can result in observing new emergent patterns in complex cases which—after several comparable observations in other cases—may become interesting assumptions for general complexity research.

Simultaneous as well as sequential alternating of methodologies and levels can be valuable in establishing a pluralistic approach to study complexity in public administration (see Section 3.3 of this chapter; Morse and Chung, 2003).

### 3.4.2 Guidelines for Researching Complex Dynamics

#### *Interaction as the Object of Research*

One of the main assumptions in complexity research is the assumption of emergent properties resulting from interactions between discrete components. Systems, especially process systems that are the primary object of this book (see Chapter 1), cannot be reduced to their discrete components, precisely due to interaction. Besides, it is interaction and emergence that create dynamism, which is another key element of a complex ontology. Interaction therefore is an important object of research.

Interaction has been the object of many pieces of research in public administration and organization sciences (e.g. Weick, 1979; Teisman, 1992; Scharpf, 1997). This begs the question of whether there is anything special about the study of interaction in the context of complexity theory.

The authors believe there is. Firstly, complexity theory explicitly pays attention to the possibility of positive and negative feedback and emergence in interaction. This means that interaction may lead to non-linear development. Complexity theory opens up this black box. Secondly, complexity theory does not a priori assume anything about the direction of interaction or how one element would drive another element in interaction. There is no a priori assumption about what drives what: there is no assumption—and here we apply one of the principles formulated by John Law (1994)—that the behaviour of the one agent is explained or caused by the actions of the other.

#### *Reflexivity*

Complexity theory begins from the idea of complex dynamics. Social systems are thought to change in unpredictable ways. To be more precise, they may change in non-linear ways, thus resulting in sudden, unexpected and

possibly radical changes. Researchers of complex systems have to continuously ask themselves whether the system is still the same as it was before. Each observation should be accompanied by the question of whether the system and its environment are still what they were assumed to be on the basis of previous observations. This calls for a reflexive stance.

Furthermore, the mechanisms behind changes in a social system vary over time. Once a researcher has observed a certain mechanism, it cannot be assumed that this mechanism will perpetuate itself in the same way. Therefore, observed causalities and driving forces should be the subject of reflexive monitoring as well.

### *Details*

Non-linearity implies that small causes may have large effects. This means that what is considered to be a detail at one moment in time may very well end up causing an entire system to change at another moment. Therefore, researchers should not too easily dismiss details as being insignificant. Methodologically, researchers should be careful not to neglect issues which they consider to be details (cf. Eshuis, 2006), for example, by using the concept of change events (see Chapter 5).

Another reason for not dismissing details too readily has to do with the epistemological idea that knowledge is socially constructed, and that this is true for the researchers' knowledge as well as other peoples' knowledge. This means that what the researcher considers to be a (minor) detail may, in fact, be a crucial issue in others' eyes. Details are social constructs. Therefore, it is part of the research process to determine what constitutes a detail and what does not. This must, therefore, be carefully thought through and not simply carelessly determined on the basis of implicit assumptions.

## **3.4.3 Guidelines for Researching Self-organization**

### *Boundary Judgments*

As discussed in Chapter 1, complex process systems contain a diversity of structures and interactions. Individual actors contribute to the creation of these structures and interactions and are also influenced by them. Since these systems, structures and interactions are interrelated, it is rather difficult to grasp a complete picture of these complex systems and their boundaries (Flood, 1999b: 72). Furthermore, both individual and collective actors participate in multiple systems, processes and structures. Due to the interconnectedness of complex systems, it is extremely difficult to identify independent, dependent and intervening variables. Flood (1999b) argues that the notion of boundary judgments is useful for demarcating research in complexity. Cilliers puts it in this way:

“Boundaries are simultaneously a function of the activity of the system itself, and a product of the strategy of description involved. In other words, we frame the system by describing it in a certain way (for a certain reason) but we are constrained in where the frame can be drawn. The boundary of the system is therefore neither purely a function of our description, nor is it a purely natural thing”. (Cillers, 2001: 141)

Research on self-organization must be clear on what the ‘self’ entails. What is the entity that organizes itself? Given the complex nature of the self-organizing systems under study, it is important for researchers to be aware of multiple interpretations and ambiguity with regard to what the ‘self’ entails. Researching self-organization implies dealing with both multiple boundary judgments by respondents (first order) and boundary judgments by the researchers themselves (second order). First order boundary judgments are extremely important in analyzing self-organization within complex systems, since these judgments are decisive for activities in the cases.

### *Dispersed Decision-making*

In self-organization there is not one central decision-maker. Instead, decision-making is fragmented. Decisions are made by several actors, possibly at several locations in space and time. Decision-making in self-organization differs from classic public administration where it is centralized in one place and often meticulously planned.

Methodologically this means that researchers should not focus solely on the traditional decision-makers (governmental actors and in particular managers of governmental organizations), the traditional places for decision-making to take place (governmental bodies) or the traditional processes of decision-making (a highly planned and coordinated form of decision-making that takes place mostly in formal policy processes or projects). What seems to be a useful approach is to research a particular geographical area and analyze the decisions that are made in the area in various arenas and scales, instead of focusing on particular policies, projects or managers in headquarters. Within the area it is important to collect data among a rich variety of sources about governance processes in order to obtain a complete picture of dispersed decision-making.

## **3.4.4 Guidelines for Researching Coevolution**

### *Trajectories of Mutually Influencing Entities as Objects of Research*

Research on coevolution involves dynamism and change. This calls attention to processes and trajectories of ongoing development. Instead of taking a picture of a situation at any particular time, research is required

to film development over time. Complexity theory on coevolving system trajectories needs empirical data over a longer time period. Byrne (2005: 105) argues for attention to history, path-dependency, context and agency. Within processes, other processes can be observed to unfold, such as path-dependency, lock-in or hysteresis (Chapter 8). Thus, we may speak of nested processes (as we may speak of nested systems).

### *No Assumptions about the Nature of Influences between Coevolving Systems*

When studying coevolution, researchers must pay attention to entities that influence and change one another. Influence is a broader category than interaction. Influence may occur through mediated contact, for example, when an alderman decides to change his policies after having read in the newspaper about the changing labour market in his country. This example shows how difficult it may be to trace influences.

It becomes even more difficult when actors are influenced unconsciously, or when systems are influenced without the actors realising it. This shows that coevolution may be driven by more than just the agency of individual actors. The process of coevolution may involve more than the sum of agency.

Thus, the researchers cannot base their work exclusively on interviews. Observations, document analysis, time series analysis and so on are required to complement the information from respondents. The methodological guideline that can be extracted from this is that researchers need to use multiple methods and collect data beyond the self-conscious meaning-making of actors.

This has to be done in order to indicate patterns of coevolution and show how public management is not an act of managers at a certain place and time but rather that it is a continuous string of events that coevolve with other developments.

## 3.5 CONCLUSION

This chapter has described two approaches to complexity: situated complexity and general complexity. General complexity assumes a general set of rules from which emergent complexity flows, whereas situated complexity posits that systems do not operate according to general rules that apply in all contexts because reality is contingent and deeply complex. These two approaches can be combined into a methodology for research. The methodology aims at understanding pluriform patterns through a combination of in-depth research of cases (situated complexity) with a broad analysis of general patterns in social systems (general complexity). This methodology combines case-based approaches with comparative approaches. It can be visualised as a T-structure, with the 'leg' of the T representing in-depth

case studies and the horizontal 'roof' representing comparative methods aiming at conclusions valid in a broader context. Within this methodology, different methods can be used to research different aspects of reality. Pluriformity in systems and patterns requires pluriformity in research methods. The results of the application of the methods and methodology are illustrated in the remainder of this book.

This chapter has also provided guidelines for future complexity research in Section 3.4. These guidelines should not be taken as strict or universally valid rules. They are to be perceived as ways of doing research that have proven to be useful in the research conducted for this book, and it is hoped that they prove to be useful for further complexity research in public administration and management.

## NOTES

1. It also corresponds to Morin's (2005) distinction between general and restricted complexity although Morin's general complexity is the equivalent of situated complexity here and Byrne's complex complexity.

# 4 Appearances and Sources of Process Dynamics

## The Case of Infrastructure Development in the UK and the Netherlands

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### 4.1 DYNAMICS AS SOURCES OF IMPLEMENTATION FAILURES

The previous chapters have presented the relationship between complexity theory and public administration (Chapter 2) as well as ideas on how complexity can be investigated and understood (Chapter 3). This chapter aims to contribute to an understanding of how processes in governance systems develop, generating intended results as well as unintended problems. Implementation problems commonly occur in governance systems. In the governance of infrastructure projects—the empirical focus of this chapter—previous studies have already indicated that well over 50 per cent of all infrastructure projects suffer from cost overruns and delays (Flyvbjerg et al., 2003).

In an attempt to explain cost overruns, Flyvbjerg et al. have focused on the initial decision made and the information on which it is based. Their message seems to be that better preparation of the implementation decision will mitigate such problems. This chapter will challenge this explanation using complex theoretical notions of process dynamics. Section 4.2 presents the basic principles of process evolutions and an initial theory on process dynamics. Section 4.3 elaborates on a discussion of the implementation of two large infrastructure projects in the UK and the Netherlands. Section 4.4 applies the theory of process dynamics and Section 4.5 draws some conclusions on it.

### 4.2 BUILDING A BETTER UNDERSTANDING OF PROCESS DYNAMICS

There is much empirical evidence that shows that governance processes often deviate from the course originally intended by the initiators. Processes often seem not to be at rest. When they do appear to be at rest, this equilibrium tends to be only temporal (Mulder and Van den Bergh, 1999). Governance processes appear to jump from one stable state to another through punctuated equilibrium. Such states are called attractors (see also

Chapter 8). The group of attractors describing all possible future states of a system forms the attractor basin (Arthur and Durlauf, 1997; Martin and Sunley, 2006). If governance processes are viewed as systems, and this book argues that this is indeed a useful conceptualization of processes, it can also be argued that these processes are located in attractor basins and have a number of possible next states available to them (see also Gerrits, 2008). Inside or outside governance process systems, pressure can build from the deviating behaviours of agents, changing conditions or change events (see Chapter 5). If the management of a process can handle the pressure, it can remain in a certain attractor. If this does not happen, the process will shift to a new attractor (handling pressure will be discussed in Chapters 6 and 7 in terms of autopoietic and dissipative self-organization). This chapter elaborates on the process dynamics of implementation processes and their sources.

There are a number of sources of dynamics that cause systems to move through the attractor basin from one attractor to another. Attractors stand for specific process states in terms of cost estimation, expected time schedules and scope definition.

The initiator of a process (such as a government department) may have a preferred attractor in mind in terms of a desired outcome. This will often be articulated in its initial decision. The initiator then attempts to guide the implementation towards his preferred attractor through his actions. On the way, however, he will be confronted with actions, changing circumstances and events guided towards other attractors.

These actions, circumstances and events that prevent officials from realising their intended output can be conceptualized as distracters. In particular, new (implicit) aims that guide the actions of other agents can create distracting effects on an intended course of implementation. They can be seen as the new attractors that may be able to influence the course of a process regardless of whether this is considered desirable by the officials in charge. Distracters can challenge the ambition to guide a governance process towards a preferred attractor. A process may have extreme difficulties in reaching both the officially preferred attractor and the distracter (the preferred attractors from stakeholders). The notion of an attractor basin illustrates the idea that processes are guided by actors in charge, aiming to achieve their goals and intentionally induced as well as emerging forces. These forces jointly create dynamics.

There are at least three sources of dynamics. Firstly, small variations in the initial conditions can generate quite different process results from earlier processes even if the approach seems to be the same. When a process evolves into a new round of implementation, the initial conditions may have been slightly altered, perhaps going unnoticed by officials but still creating a situation where action methods successfully applied during the earlier round end up working out quite differently.

The second source of dynamics is the multiplicity of contexts in which process systems are embedded. Often a variety in context will not interfere



with a particular process. There is, however, no guarantee that this will not happen. Even if only a part of the neighbouring action systems interfere with an implementation process, dynamics will appear. The problem with complex systems is that officials in charge of an implementation process never know in advance which part of the multiple contexts will generate distracting actions and changing conditions.

Change events are a third source of dynamics: these are events that apparently appear from nowhere, that do not have to be strongly related to the implementation as such, but that may still have decisive effects on process development. Chapter 5 discusses these change events in more detail.

Here, governance processes are presented as multilayered systems in which the presence of the aforementioned sources of dynamics is ineluctable and prevents public officials from realising their intended output. In this complexity theory perspective, a process that reaches the initially preferred attractors is more exceptional than processes that will evolve into a different state than initially intended. Of course one can blame the initiator for this as often tends to happen in research, media and parliament. It is, in fact, the dynamic and sometimes non-linear dynamics of the implementation system itself that really cause deviating outcomes.

#### **4.2.1 Strange Attractors**

The impact of complexity on governance processes is often underestimated. Even processes that are perceived by initiating actors and organizations to be the implementation of their goals and ambitions are embedded in a larger and compounded system. All kinds of actions and interactions can occur within that system and many of these will not focus (primarily) on the implementation of the goals of an initiating actor or organization. Implementation therefore will usually be subjected to ‘strange’ actions and interactions. The term ‘strange’ is placed within quotation marks because of its double meaning. Practitioners involved are often startled by actions that interfere with their intended course of action. They tend to see them as irrational and strange because they diverge from what they want. In complexity theory, however, the term strange is connected to the term attractor. A strange attractor describes the actual state of a system. It is understood that social systems do not have a continuous tendency towards a single point, nor do they alternate between two points (torus attractor). Strange attractors describe a string of system states that are mutually (slightly) different from one another (see also Chapter 8 and e.g. Otter, 2000). In computer science endless recurrences of an experiment or simulation can lead to the conclusion that the system ends up at the same point all the time. This then is a fixed point attractor.

In terms of governance processes, it is not uncommon to assume that their system state is influenced by the strategic actions of participants aiming to realise their preferred attractor but also by unforeseen influences of variations in initial conditions, multiple contexts and change events, and therefore change. A strange attractor can differ from the intended outputs.

Implementation processes can now be conceptualized as a battle between ‘actors in charge’ aiming to reach a desired attractor and distracters creating process dynamics and a high probability of changes in course and outcome. The explanation for cost overruns and delays, or any other implementation problem, can be mostly found in the dynamics of the implementation process itself. Even if implementation begins with a well-elaborated-upon plan and implementation scheme, these problems will not disappear. Evidence of this can be found in the studies of Flyvbjerg et al. (2003) that show that the situation has not been improving in the last few decades, despite the knowledge and efforts made to overcome this. This is intriguing because a whole range of instruments has been developed and applied in that period just to get a handle on cost development and schedule. The explanation for why implementation problems continue to be alive and kicking and will continue to exist in the upcoming decades can be found in the dynamics of the process.

#### **4.2.2 Implementation Dynamics: An Initial Theory on Governance Process Dynamics**

As indicated in Chapter 2, dynamics have been part of public administration theories for a long time (see the works of Easton, 1965; Cohen et al., 1972; and others). Network theory is presented as a governance approach that deals explicitly with the interdependency between agents in networks. The question is what complexity theory can add to that. A first step in answering this question lies in exploring the notion of implementation as an ongoing battle between actors in charge, the distracters from other participating stakeholders and the ongoing dynamics resulting from the initial conditions, multiple contexts and change events. Sometimes the actors in charge end up at the desired fixed point in the future: realising a project within time, budget and quality requirements. Often, however, outcomes are guided considerably by distracters or other sources of dynamics. Non-linear dynamics will then be the dominant course of implementation.

##### *Three Patterns of Non-linear Dynamics*

Implementation can develop in different directions as a result of the confrontation between distracters and the preferred attractors as projected by process initiators. First it can result in a process break-off. This state of inertia expresses itself when implementation agents are unable to deal with distracters. The cases presented in this chapter will illustrate moments of break-off. It will also be shown that break-off really can result in the death and fall of an agent, organization and indeed the whole set of arrangements in which the implementation process is embedded.

Secondly, the battle between the projected attractor and the distracters of other actors are ‘won’ by the latter. This means that the initial goals are set aside and new ones enter the arena, changing the attractor basin. This can lead to a situation where initial enthusiasm for a new approach

dissipates after a while. A new approach does not coevolve with existing fixed demands. Certain critical moments in the case studies where this almost happened will be highlighted.

A third pattern of non-linearity appears when a ‘process in chaos’ due to appearances of distracters evolves into a new punctuated equilibrium, a temporary stable development that is appreciated (by agents or researchers) as a new order. This idea builds upon the complexity theories about chaos and catastrophes and is related to the idea presented in the first chapter that processes can develop guidance of their own through their self-organizing capacity. A change event in one of the two case studies will be shown to have led to a new round of implementation that sets a new order out of chaos—what the agents in charge view as an order of a higher level because a synergy between official goals and distracters is realised and actually succeeds in cutting back on cost overruns. It will be argued that this is not only generated by the new managers in charge, but also by the process itself and its participating agents.

### *Dynamics of What? In Search of the Process System*

After highlighting these three patterns of implementation dynamics, the question that then needs to be raised is what the subject of dynamics is. In other words, what is the process we are looking at? As indicated in Chapter 1, complexity theory focuses on process systems. A system in the governance domain is not a simple object that can be found somewhere. It is a composite object in which all relevant elements from which processes evolve come together. A process is initiated and managed by *individuals and groups of people*. These are the two most concrete elements of processes. They develop *courses of action*. The courses of action can be linear in time, but can also be non-linear. Individuals, however, are embedded in *arrangements*, especially organizations. They are occupants of a position and for this reason must comply with the ways in which an organization works. These arrangements are embedded in larger *systems of values*. For instance, a well-known distinction can be made between managers in organizations in the private sector and those in the public sector. Even beyond these boundaries, events can take place that greatly trigger the non-linear developments in what will be called a process system, to be discussed in Chapter 5.

## 4.3 TWO IMPLEMENTATION PROCESSES

Empirical research is required in order to identify how process dynamics evolve and the sources that guide them. Our initial theory on process system dynamics is applied to two implementation cases: the upgrading of a

rail trajectory in the UK and the building of a new freight railway trajectory in the Netherlands. These cases are part of a set of European infrastructure projects we studied (see [www.netlipse.eu](http://www.netlipse.eu) for a full overview). The EU has sponsored this research project to increase their understanding of cost overruns and delays. Morris and Hough (1987) found cost overruns and delays to be the norm for 3,500 projects they reviewed and Reichelt and Lyneiss (1999) found that the average cost overrun was 86 per cent and the average delay was 55 per cent.

As stated earlier, the inadequacies of initial decisions are often blamed for cost overruns and delays (Flyvbjerg et al., 2003). Governments constantly attempt to develop and apply new methods of rationalisation and instruments of control. The NETLIPSE research, however, challenges the assumption that if managers know what to do in advance (the scope of projects), if the rules of implementation are clear and if the tasks of the contractors are fixed, the problems concerning cost overruns and delays can be solved. Emphasis is placed on the dynamics of the implementation process. The studies were begun with a self-evaluation by managers in charge of the upgrading during the period of research. Based on NETLIPSE protocol, they answered questions on how the process of implementation had unfolded. Then a two-day visitation was organized. During this period, two of the authors interviewed a dozen representatives involved in the projects. Additional reports and documents were provided as required. An extensive case study was conducted based on this material. The results were presented to officials, giving them the opportunity to point out errors or misunderstandings, and have been discussed in an independent verification board meeting. This report is the basis for a secondary analysis that is presented here. In order to structure the amount of information available on this case, the round model was applied (Teisman, 2000). An overview of this is presented in Table 4.1.

*Table 4.1* A Reconstruction of the Implementation Process in Rounds

	<i>West Coast Main Line</i>	<i>Betuweline</i>
Round 1	The story of a non-innovative British Rail public monopoly until 1993	Scope expansion, disappointing private contributions and rising costs until 1995
Round 2	The story of broken dreams in the private domain until 2000	The never-ending story of ongoing cost overruns until 2001
Round 3	The story of reinventing public-private cooperation until the upgrading is completed and the number of passengers has increased	From cost overruns to refunding abilities and delivering a high-quality, but still largely unused, trajectory

### 4.3.1 WCML: Dynamic Processes of Upgrading

The upgraded West Coast Main Line (WCML), boasting 650 km of the UK's longest and busiest mixed-use railway, will be delivered in 2009. It links London more closely with Glasgow and also serves Birmingham, Manchester, Liverpool and North Wales. More than 2,000 trains a day use the line, covering 22 million passenger-train km and 6 million freight-train km a year. The train services consist of long distance, regional and local commuter trains and freight traffic. The WCML accommodates around 40 per cent of the total rail freight traffic movements in the UK. The cost



Map 4.1 West Coast Main Line

calculation has developed in a rather non-linear manner from £2.2bn to £13bn plus and back to £8,3bn again.

### *Growing into Inertia in a Non-innovative British Rail*

The WCML was built in stages over a period of three decades from the 1830s and was electrified in the 1970s. British Railways, created out of regional rail industries in 1948, managed the WCML. Its successor, British Rail (BR), was put in charge of the WCML in the 1970s. At that stage, upgrading plans were already being made. Due to a lack of funds, however, the plans were never implemented. Money was invested in the areas where the greatest chances of breakdowns with severe effects were expected. Thanks to sufficient knowledge about the technical state of the WCML, BR engineers managed to keep the system working. Innovations, however, were not applied. As a result, the infrastructure became outdated and train services were unreliable. The management of BR, however, could not find a way out and persisted with repair strategies.

In the 1990s, this period of 'public monopoly' came to an end. A combination of factors including discontent over the ageing infrastructure system and the idea that BR was not able to adjust to new demands, lack of support for BR in its field of action, the conservative administration in Downing Street and a wave of privatisation created a situation in which the elimination of BR was finally executed. Even in hindsight an explanation cannot be found for what happened here. It was simply the unique combination of the behaviour of the rail industry, the behaviour of subsystems of shareholders and stakeholders in the field of action and context changes that stimulated the dismantlement of public monopolies such as BR. BR had not been able to coevolve with changing circumstances and expectations for a long time, but was confronted with catastrophic changes within a short period of time.

### *The Story of Broken Dreams in the Private Domain*

The Railway Act of 1993 was the starting point for the process that led to the privatisation of BR. Railtrack (RT) took over ownership of the tracks, signalling and stations and was privatised in 1997. The officials at the Ministry of Transport thought at the time that from then on they were no longer responsible for upgrading the WCML. Even though RT remained reliant on substantial public subsidies, which were provided by the Office of Passenger Rail Franchising (OPRAF) for capital investment and revenue support, and the Office of the Rail Regulator (ORR) was established to regulate the industry, the expectation was that the market would take over. The locus of the initiating action system shifted to the private domain. The public subsystems in the action field, OPRAF and ORR, developed a more standoffish strategy. This change in institutional embedding had a substantial impact on the upgrading process of

the WCML. RT was different from BR in many ways, including in terms of the people in charge, knowledge available and scope and ambitions. In several ways RT also intended to be quite different (better) than BR. Private and innovative were the new catchwords.

In 1996, RT entered into a contract with OPRAF that called for modernization through the use of existing technologies. Virgin Rail Group (VRG), a joint venture of the Virgin Group and the Stagecoach Group, won the 15-year franchise to operate long-distance passenger trains on the WCML in 1997. VRG agreed with RT on a renewal and upgrade program. It was a technical innovation jump, allowing for higher speed trains with a higher frequency. VRG was of the view that significant increases in capacity would be required for its franchise. After being approved by OPRAF and ORR, the upgrade contract was signed in 1998.

RT and VRG started the upgrading works enthusiastically, relying on new technology such as moving block signalling to increase capacity and train speeds. RT estimated that the upgrade would cost £3bn and would be ready by 2005. The travel time from London to Birmingham would be reduced from one hour 40 minutes to one hour. VRG ordered a fleet of new Italian tilting trains capable of running at 140 miles per hour. The delivery was planned for May 2002.

Initially this promised to be a success. However, the program ran into some unexpected difficulties. The costs increased rapidly, the moving block signalling technology turned out to be immature and VRG's procurement of new tilting train rolling stock fell behind schedule. In December 1999 RT decided to cancel this innovation. Other factors, including West Coast contract liabilities, created a financial crisis for RT that resulted in bankruptcy in 2001.

### *Reinventing Public-private Cooperation: A Combined Approach*

The bankruptcy of RT resulted in a reappraisal of plans. The Strategic Rail Authority (SRA), a product of the Blair Administration, was asked to find a way out. The SRA estimated that the upgrade would cost £13bn and would be ready by 2008, with a maximum speed of 200 km per hour. It also concluded that abandoning the project was not a viable option. Eighty per cent of the works were required to replace the ageing infrastructure. Moreover, stopping works already contractually agreed upon would have incurred substantial financial penalties for Network Rail (NWR), the not-for-profit company that took over infrastructure provision in October 2002. SRA renegotiated the contracts with VRG. Instead of a high-risk and high-return ambition, they accepted a low-risk, low-return contract. A hybrid approach emerged in which the VRG, the non-profit NWR and the government all played important roles.

In this third round of works, the upgrading seems to be coming to a desired end and the estimated costs were brought back from £13bn to

£9bn in December 2006. The upgrade between Euston and Crewe was completed in 2004. This enabled accelerated improved services to be introduced on all key interurban corridors, including increased frequencies and faster travelling times. Trains were permitted to operate at 125 miles per hour in tilt mode south of Crewe. These also enabled accelerated services including increased frequencies and faster travelling times to be introduced on all key corridors. The second stage came in 2005 when the line north of Crewe was upgraded to allow for trains to travel at 125 miles per hour in tilt mode. By April 2006, around three-quarters of the physical work on the project was complete. The final delivery took place in December 2008.

### **4.3.2 The Betuweline: Building the First Dedicated Freight Railway in Europe**

The 160-km-long, double-track dedicated freight railway operating between Rotterdam and the German border was opened in June 2007. It is expected to become the backbone of Dutch freight rail transport and extends connections with the European freight rail network. Three rounds of implementation can be observed. The first is a period of scope development and rising budgets. The second is the struggle against cost overruns. The third involves finding a balance and financial savings.

#### *Scope Development and Rising Costs 1990–1995*

The process began with a proposal to upgrade a regional passenger line in order to use it for freight transport. In 1990, the Ministry of Transport estimated the costs of this project to be around 1 billion euros. The execution of the project began once this document was approved by Parliament. The Ministry assigned the task of execution to the Dutch Railway Company NS, with the support of the Ministry through its formal Planning Procedure (PKB). In a policy document published in 1993, the cost rose to 3 billion euros. The connection with the harbor areas was included and the idea of upgrading was replaced by the proposal of a new dedicated freight railway line. Noise screens, avoiding the division of the landscape, measures to protect soil and water and nature-saving measures became a part of the scope definition.

Tensions were already growing, however. The NS utilized a rather technical planning strategy, leaving local and societal stakeholders out of the process as much as possible and implementing their own decisions. Several demands from stakeholders had not been addressed. A stakeholder lobby on Parliament began and soon Parliament proposed additional scope expansions, such as a tunnel, track lowering and a roof on the tracks at Barendrecht. This pushed the cost of the project up to €3.3 bn. In May 1994, the execution of the Betuweline began. It faced its first potential





Map 4.2 Betuweline

distracter within the year. In 1995 a new elected government had serious doubts about the added value of the line in relation to the costs and the externalities. A committee was installed to solve the dispute. Its report proposed two additional tunnels. This seemed to be enough to continue execution. The budget was settled in 1995 at €3.7 bn.

### *The Never-ending Story of Ongoing Cost Overruns 1995–2001*

In the second round, the battle against the fixed budget set by the Ministry, their desired attractor and the real cost developments as estimated by ProRail, the successor of NS as the infrastructure provider, was crucial.

ProRail reported a cost overrun of €425 million in 1996. The causes were price level increases, scope changes, archaeology activities and soil pollution cleaning. The cost estimations continued to rise to €4.5 billion in 1999. The fixed budget at that time was €4 billion. This tension caused a battle between officials of the departments, who just wanted to stick to their budget reality, and officials of ProRail, who wanted the department to accept their more 'realistic' estimation. The process of sticking to the budgets approved by Parliament clearly differs from the process of building a trajectory. It is intriguing to see how both parties attempted to settle these immanent process tensions through agreements on paper. They tried to define a final scope definition and a final cost estimate. Two agreements were signed to deal with the tensions. This is a widely used attempt to get a grip on implementation problems. While the Ministry assumed that ProRail was committed to the fixed budget, in reality ProRail was dedicated to the project realisation. The upside of the agreements is that the project was allowed to continue. The joint reality is one of budget control and guidance.

### *From Cost Overruns to Refunding Abilities 2000–2007*

The reality on paper and the reality in the field must coincide. ProRail took the first step. In its quarterly reports in 2000, it presented an estimated cost overrun of €272 million. A second step was taken by an external consultant, AT Kearney, that estimated a €345 million deficit in 2001.

Cost overruns could now no longer be denied by the Minister and Parliament. Action had to be taken, otherwise the Minister would be in trouble. First the sponsorship was transferred from the policy department of the Ministry to the department for implementation and maintenance (RWS). The rationale for this move was that RWS had a long history of project directorship and contracting out. This action served as an act of decisiveness that was accepted by Parliament. In order to maintain support from its Policy Department, the Minister claimed an additional budget for uncertainties and gave control of this budget to the Policy Department within the Ministry of Transport.

Before agreement on this budget for uncertainties was settled, new elections again served as an external event that placed tension on the entire process. The new government demanded budget overviews of all large infrastructure projects including the Betuweline. The Ministry decided to expand the boundaries of the relevant governance system, when it proposed to create a combined reservation of €985 million for the Betuweline and Dutch High Speed Link between Amsterdam and Belgium. The reservation was accepted by the Ministry but initially not by Parliament. Strangely enough, this unsettled dispute did not generate additional process dynamics.

Since then, cost overruns disappeared from the agenda of Parliament, the Department and ProRail. The first reason for this can be found in the

process system of implementation: the project organization had built up enough knowledge about the technical system, their environment and the private executors to provide guidance according to expectations. The second important reason was an external event, namely, economic recession. Recession eases the labour market in the building industry. The new tender procedures did result in cheaper contracts. From 2004 to 2007, €350 million were refunded to the Ministry.

#### 4.4 ANALYSIS OF PROCESS DYNAMICS

In attempting to understand process dynamics, the dynamics of cost overruns and the scope of the project are first presented as characteristics of the strange attractors of the process. This analysis will be completed with an indication of the quality of the product delivered and the expected revenues. Secondly, the focus will be on the dynamics of the implementation process as such. It is made clear that dynamics can be generated by a variety of sources, from small changes in initial conditions to shifts in the contexts of a process and unexpected events in the surroundings of the process. At the same time, official goals are confronted with distracters, which can be generated by all elements of a process system (agent, group, organization and system).

##### 4.4.1 Dynamics in Cost Estimations and Scope: From Preferred to the Strange Attractor

The outcomes in both of the earlier case studies are intriguing. The estimations in the case of the WCML went up from €3 billion to €13 billion in round two, while a reduction from €13 billion to €9 billion was possible in the next round. The results of the Betuweline are in several respects different from that of the WCML. The dynamics show a strong non-linear development of costs at the WCML and a more linear development at the Betuweline. In the latter case, while the budget in 1995 was €3.7 billion, the actual costs in 2007 was €4.6 billion. This implies a cost overrun of €919 billion, mainly caused by regular price increases and approved scope changes. The amount of real cost increases is approximately 5 per cent.

##### *The Absence of a Single Attractor; Implementation as a Non-linear Goal-seeking Process*

The two case studies confirm the idea that there is no one single attractor in governance processes. In addition, the preferred attractor is often not the same as the strange attractor. The dynamics in scope are high. In the first round, the WCML scope is on repair while the Betuweline scope changes from upgrading an existing line to realising a railway dedicated to freight

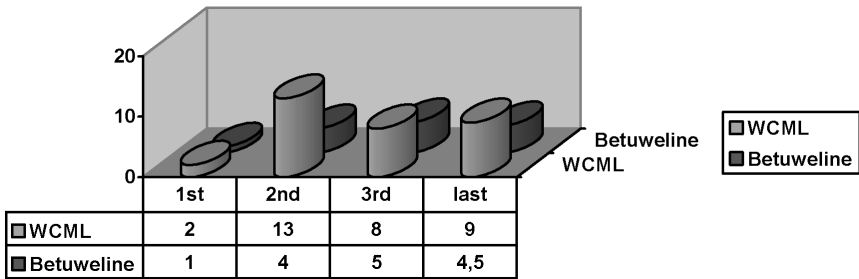


Figure 4.1 Cost dynamics as ‘normal’ occurrences in project developments.

transport. In the second round, the WCML is confronted with a scope change to innovation and shaping a profitable market, while the Betuweline is confronted with a scope reduction in order to manage cost overruns. In the third round of the WCML project, the scope is less on innovation, and more on creating a joint interest for a variety of shareholders and stakeholders. Realising a joint business case becomes the main scope of the project, adding a variety of additional ambitions. Three developments that evolve together (control of costs, critique tones down and the number of passengers goes up) seem to become the new attractor. It is also amazing to see that, in hindsight, some believe that this was all intentional in the first place.

In the third round of the Betuweline, however, the scope is shifting to the image of the project. The cost development is under control, the line is built, but political and social support for the line remains limited. A defendable output is delivered in 2007, but to little applause. Thus, even though this process was able to reach its initial attractor to a large extent, this is not perceived to be the case by a large part of the outside world. The Betuweline is perceived as an example of having cost overruns, generating the destruction of valuable rural areas and creating a facility that is little used. It is amazing to see that in hindsight many tend to believe that this project generated mainly unintended and undesired outcomes.

#### 4.4.2 Where can Dynamics be Observed?

There are a variety of dynamics that have an impact on the process in both case studies. On the level of individuals, groups, organizations and context, things have changed.

On the level of the individuals and groups, the WCML management was shown to have been replaced twice, which caused changes in context and conditions. The shift from public to private management had non-linear consequences and the shift to a hybrid management had stabilizing consequences.

In the Betuweline case, the management changed more gradually. This generated a more stable process, but also stabilized the boundary judgment

for years. The management of the project defined the exploitation of the line clearly outside its own scope. This goes for the management of ProRail and the Ministry alike. This finally has generated a situation in the WCML where the number of users has grown due to better and faster services, while in the case of the Betuweline it will take more time to generate a market. Stable boundary judgments prevented the project from having large cost overruns and delays, but also from a strong market orientation.

Another appearance of non-linearity on the level of the management and due to a multiplicity of contexts and varying initial conditions can be found in the approach towards technology. The management in the WCML case changes its approach towards technology several times. First it engages in non-innovation, then large-scale innovations and radical upgrading, seemingly unrestricted by any path-dependency from the past, finally abandoning innovation experiments, using only a few innovations that had been earlier tested on other places. In the Betuweline case, innovations have been realised in relative silence. In the first round, the focus was on upgrading an existing line, then on creating a new line with a focus on safety and preventing delays. The European safety system ERTMS has been applied. The most interesting point here again is the conflicting perception of innovation. While professionals appreciate what has been achieved in terms of technology, the dominant vision of the railway in Dutch media is that of an old-fashioned unsustainable solution, with clear negative spatial impacts.

A third appearance of non-linear dynamics on the level of the management can be found in their perception of what the project was about. In the WCML case, the managers in the first round focus on technical repair, in the second round on profit for their organizations and in the third round on dealing with shareholders and stakeholders to create a joint project and joint profits. In the Betuweline case, the managers in the first round applied the plans for the line as a technical solution in a physical context, forgetting the social context. This created opposition towards the entire implementation process. In the second round, more emphasis was placed on the social context. It created a 'party of whatever you ask, you will get', leading to an upward tension on costs. In the third round, the emphasis was on shareholders and placing stakeholders more at arms length. All these changes seem to result from the way processes did evolve and the multiplicity of contexts the project is a part of.

On the level of organizations, both cases show high degrees of dynamics. In the case of the WCML, a variety of new organizations was established and abolished again (especially RT and SRA). In the Betuweline case, the monopolist NS was broken up into several organizations, under which one was ProRail. The relationship between the new service provider NS and the rail provider ProRail remains tense. A lot of interactions are not about the project itself, but about establishing more desirable power relations between the two and it is always extremely difficult to know in advance what the combination will be.

There were also clear changes in the institutional context. It is intriguing to see that the privatisation of BR, meant to revitalize the rail industry, in practice generated extreme curves in increased cost estimations. The ambition of innovation finally turned out to be a strange attractor: it turned the attention of the management away from the existing rail system. In hindsight, many observers felt that the new management was blinded by the attractiveness of radical innovation, forgetting to develop a type of changed management in which the existing system could be transformed into a highly innovative one.

The existing system became a distracter from the perspective of its management. It raised demands the new management did not understand. This led to a fatal mismatch, generating the broken dream of innovation as well as the death of a young organization within one decade. In the case of the Betuweline, the new rail provider ProRail was also attacked in the media, Parliament and by the Dutch service provider NS, which was the former monopolist. ProRail, however, used the external critique, which was present from the very beginning, as an external enemy, helping to create internal coherence and joint spirit. This shows that an external pressure sometimes can work as a distracter, but can also help the management to improve internal coherence. It is here that we see how distracters at work can be used by the management in a positive way.

#### **4.4.3 Dynamics and their Sources**

As pointed out earlier, three sources can be identified for dynamics: (a) changes in initial conditions reshaping public management action in often unforeseen ways, (b) multiplicity of subsystems and contexts in which projects are implemented and (c) change events during the process of implementation. This section elaborates on how these sources guide implementation processes.

##### *Small Variations in Initial Conditions Creating Impressive Variations in Effects*

Each round of decision-making can be seen as a new trajectory guided by a unique set of initial conditions. These conditions are based on a combination of what has happened in past processes and what is actually happening in the context at the start of the new round.

The beginning of both the second and third rounds in the case of the WCML can be seen as dramatic changes in terms of institutional context. At the same time, however, small changes took place in the conditions at the beginning of a new trajectory which had a substantial impact on process dynamics. Not only did privatisation propel RT and VRG into action, but it also affected the agenda of these agents. The will to be different from BR could have been one of the many small variations at the beginning of

the second round. It is quite normal for newcomers to want to show their ability to do better. RT and VRG, however, exaggerated this by adopting innovation that had not been applied before on such a scale and that generated major challenges that could finally not be met by RT. Just because they did not want to become prisoners to the existing system, they neglected its demands, which led to failure.

Curiously enough, the combination of the failure of BR in the first round and the dramatic end of RT in the second round created a unique condition at the beginning of the third round. All parties beyond the boundaries of the public and private domain took up the idea that these failures should not happen again. In hindsight, the respondents concluded that this constituted a joint interest which generated a collaborative approach. Despite new institutional dynamics, such as the conflicts between SRA and other public authorities and the abandonment of SRA, these had minor impacts due to the ability to focus on a joint interest.

A change event in the Betuweline case took place in its early days. The technocratic approach applied by NS created enemies and a bad image in the media. These initial conditions stabilized and never disappeared. What we see here is the establishment of images of the project by the media that could not be changed.

This case also shows how variations in initial conditions in new rounds, coming from surrounding action systems such as the construction industry, impacted the implementation. In the second round, an overheated situation in the industry led to higher prices, while the recession in the third round was the lucky opportunity for cost reduction. These variations were not foreseen at all. They just happened to the management for better or for worse. Thus, variations in initial conditions exist in the management approach as in the external systems. Many will disappear without really having any impact on the course of implementation. Some, however, can develop into important variables that guide the process and its outcomes much more than expected.

### *Multiple Contexts Creating Waves of Dynamics for Policy Projects*

Multiplicity of contexts is a second source of dynamics. Managers cannot know in advance what the relevant context will be and how contexts will interfere with implementation and with one another. In fact, this raises the question of relevant judgments about what the process is that managers should feel responsible for and what can be defined as outside their scope. The case studies show that the outside world is seen as irrelevant as long as it does not distract the process. It could, however, also be the case that actions perceived not to be highly relevant can have a great impact on the course and development of implementation.

One example is the impact of the media on the Betuweline implementation process. Over and over again this project was presented in the media

as an old-fashioned, nature destroying project in a society that cherishes qualities of life such as silence, unspoiled landscapes and less transport of goods. This shaming and blaming ability of the media went on until and even beyond the moment of the opening of the line. Every new administration between the start of the project in 1989 and 2004 reconsidered the decision-making of the project or at least was asked to do so because of the pressures created by negative media attention. The project was subjected to a parliamentary inquiry on the causes of the cost overruns and delays and the reasons for the decision to build the rail line to have been made too easily. Every report on the Betuweline, no matter how innocent in its content, was a new reason for post-materialist groups and the public and media to start a new round of blaming and shaming. For this reason, the implementation was clearly also guided by public opinion and media exposure. This does not necessarily have only a negative impact. The high media pressure that accelerated the bankruptcy of RT in the WCML case generated an internal joint sense of not wanting to make mistakes in the Betuweline case.

In both cases, interference between different levels of government had an impact on the process. In both cases there was a strong appeal from the EU government to implement the new safety system ERTMS. As such, the EU is part of the multilayered governance system surrounding the projects. Officials in charge have to combine national guidelines on planning, political control and accountancy with local and regional demands as well as EU demands. The management in both cases reacted differently to the EU demands. The WCML management, confronted with innovation failures in the second round, considered innovation to be dangerous. It decided to keep the ERTMS outside its system. The Betuweline officials, on the other hand, took the EU goals into consideration, leading to a partial implementation of the ERTMS standards.

### *Change Events Forcing Public Managers to Adjust and Change Scope*

Implementation processes of infrastructure projects take many years. In this life cycle, it is normal for unforeseen events to emerge. These events can become guiding forces for implementation. Change events will be dealt with explicitly in the next chapter. Here, two events are presented that are both accidents that had important impacts. The first is the Hatfield accident. It marks an important turning point in public opinion on the privatised rail industry. The second is the accidents in tunnels in southern Europe that generated unforeseen dynamics for the design and construction of the Betuweline.

The Hatfield Rail Crash in October 2000, a result of gauge corner cracking, was not extremely dramatic in terms of the death rate (four people were killed). However, it had a tremendous impact on the development of the privatised rail industry system. The media portrayed this as incompetence



on the part of the industry and more specifically on the part of RT. What was more important was the reaction of RT. It was unsure about whether this problem would appear in many other parts of the system. It therefore announced a variety of speed restrictions. This crippled the rail system as a whole and decreased the income of RT substantially, speeding up the moment of bankruptcy. This shows how change events can have a large impact. At the same time, the cases highlight the crucial role of management. Disturbance is not only a function of the distracting event, but also of the responsiveness of the managers in charge. This is a pattern guiding dynamics that has been highlighted in this publication over and over again.

The second example is even more disconnected from the case. Accidents occurred in the southern European tunnels of Kaprun and Mont Blanc in the 1990s. The fires proved difficult to control and revealed the failure of the safety system. The tragic accidents had no direct effect on the implementation of the Betuweline. Indirectly, however, they generated new demands on safety criteria and a strong punch to develop new legislation on this subject. The managers of the Betuweline implementation heard rumours about possible new safety standards formulated on both the national and European level, but did not know what to expect. During this period they continued to develop plans for tunnels in the Betuwe trajectory. These tunnels were adopted in order to deal with demand from local and regional governments as well as environmentalist groups. After new legislation was adopted, however, heated discussions burst out on the required safety level of the tunnels. This debate was not controlled by the project managers or any other officials. As a result of the accidents, a whole variety of insights from new and existing research received media and political attention. Commercial parties saw new changes for market application or expansion for their (safety-oriented) technologies available. The tunnels under construction therefore suddenly became an important element for discussion and redesign again. Ministries were active in this discussion as well as lawyers, builders, universities and the fire brigade. While the tunnels were a broadly supported solution for high-quality implementation of the line in the existing landscape and residential areas in the first rounds, they now suddenly became potential sources of danger and accidents. This is an instructive example of the impact external events can have on the execution of a project. The next chapter elaborates on the impact of events.

In sum, it can be concluded that implementation is guided by managers and shareholders attempting to realise their preferred attractor. They do, however, have to cope with multiple contexts, characterized by high variations in initial conditions (as present in subsequent policy rounds) and change events.

It seems to be important to develop more knowledge about the effects of dynamics which prevent officials from realising their preferred attractors. It seems that keeping away the impact of distracting actions and events from a project can sometimes be effective. The case studies in this chapter

also showed, however, that this approach does not, by any means, guarantee success. Processes could very well end up in a different attractor than that intended by the project managers. The success of attempts to avoid this cannot be known in advance, and when later in the process adjustment becomes unavoidable, the impact on cost overruns and delays will often be much higher and an even less preferred attractor will prove to be the strange attractor. Adjustment of scope and new planning and budget setting then is much more accurate (and thus changing the preferred attractors), even though it requires renegotiation with sponsors and other principals. Many of these actors do not like to be surprised by distracting dynamics, but not taking them seriously can lead to an even nastier surprise later in the process.

#### **4.5 DEALING WITH NON-LINEAR DYNAMICS: CONCLUDING REMARKS**

The discrepancy between the complex public task of infrastructure development and the capability of the management and administration to deal with this task seems to be here to stay. As Flyvbjerg and others have indicated, the majority of cases face cost overruns. The appearance of dynamics and the sources generating dynamics such as cost overruns have been reconsidered, and we have come to the conclusion, in contrast with other studies, that implementation problems are only to a minor extent created at the beginning of the implementation. A majority of problems appear during implementation and many of these are not directly linked to the initial decision at all, nor are they linked to the way in which the project is managed. It is not only true that cost overruns are an important topic in our two cases, but also that the processes are much more dynamics themselves. Even the scope is under regular reconsideration, the management is renewed several times, organizations are established and terminated and the institutional context changes over time, sometimes even dramatically. On top of this, all important events have an impact on the implementation process.

From all this it then becomes possible to understand why such a large variety of implementation processes face obstacles in reaching their intended attractors. Dynamic evolution of processes is a normal implementation path in complex governance systems. Stable development can occur, but non-linear dynamics will be a more common occurrence of implementation processes. Because changes simultaneously and subsequently take place in content, process and context alike, it seems quite impossible to predict their joint impact. Hence, attempts to overcome or control them beforehand are often conducted in vain.

# 5 Non-Linear Dynamics in Port Systems

## Change Events at Work

*Marcel van Gils, Lasse Gerrits, Geert  
R. Teisman*

### 5.1 INTRODUCTION

“We have been struggling for about 15 years to get this project realised. Yes, we made mistakes in the first years when not involving crucial actors in the process and that way mobilizing lots of resistance. It took us years to “repair” the damage between public servants and the environmental pressure groups. Nevertheless, by the end we reached an agreement that was (or did it seem) satisfying for all actors, ranging from municipalities to the province, ministries, the European Union, lots of companies and even different environmental pressure groups and the citizen representation. That already was a major outcome in itself, I think. That’s why we were so much struck by the decision of the Council of State to reject the zoning procedure (of about 6,000 pages . . . the preparation took us four years. . .). The Council reckoned the objections of a few farmers and fishers as crucial. This event causes at least an additional delay of two years. To be honest I would really not know how we could have managed the process to get the project past the Council and even more worrying I have no clue how we should proceed the process to finally realise this highly important project”. (Interview quote)

This quote refers to a change event in one of the case studies discussed in this chapter. It provides an apt illustration of the existence of non-linear dynamics in governance processes. A single action in a legal subsystem away from what was perceived to be the centre of the process created confusion and disorganization, the unintended outcome of which was several years of hard work with no progress. These kind of events, unforeseen but having a considerable impact on the course and development of governance processes, will become more and more important in complex process systems. In particular, unforeseen events can generate non-linearity, for better or for worse.

The importance of change events is well recognised in government practice. Many officials involved in project management have been confronted with these kinds of events, which they often refer to as “nightmares”, and

are therefore interested in figuring out how to deal with them. Existing public management approaches have not incorporated change events explicitly into their theories. Some simply argue that unexpected events are difficult to manage. This is true in terms of control. The question is, however, whether this is also true in terms of adaptation if events occur and in terms of being prepared and even being open to events. This chapter attempts to deepen our understanding of change events. It begins from the broadly accepted and shared vision that change events are unforeseen, unpredictable and difficult to manage. Increasing our understanding of how these events occur and how they are dealt with is a first step towards a theory on managing change events. This may not allow for control over the occurrence of change events but it does help to make them less surprising.

The notion in complexity theory that governance systems are dynamic (Gerrits, 2008) is adopted here. Governance processes regularly precede dissent from initial expectations. Three sources of dynamics were presented in the previous chapter. This chapter focuses on the third source: emerging events that cause changes in the course of governance processes. Emerging events can easily generate dynamics. “The complexity is about how a seemingly trivial event may trigger changes far removed from it in time and space” (Giddens, 1984: 10). This chapter elaborates upon four governance processes in two of the largest European harbors, Hamburg and Rotterdam. Harbor systems are excellent representatives of complex systems. The governance systems encompass local community planning as well as global logistics planning. As a result, considerable numbers of actors with different stakes, strategies and operating procedures attempt to influence port governance processes. The interrelations between these subsystems and their actions reinforce the dynamic and unpredictable course of development. Even seemingly small events may be the beginning of a chain of events and actions that generate high impact changes.

Section 5.2 develops a preliminary theory on change events, and distinguishes events in terms of their origins, response and impact. Sections 5.3 and 5.4 illustrate change events that occurred in four governance processes in the ports of Hamburg and Rotterdam. The chapter concludes with insights into change events and offers ideas about how to make the unmanageable and surprising event a part of management theory.

## **5.2 A PRELIMINARY THEORY ON CHANGE EVENTS GENERATING DYNAMIC GOVERNANCE PROCESSES**

Complexity theory explicitly deals with the idea that events far away can have a disproportional effect closer to the recipient. The famous metaphor of such occurrences is the butterfly effect coined by Lorenz (1963). He discovered that minor variations in the equations describing a weather system can cause major changes when the simulation is run over and over again.

After a number of cycles, the line representing convector streams will bifurcate in a different direction to the previous run. The idea that trivial events can cause significant change is useful for scholars in public governance, even though the Lorenz simulation is not directly applicable. Public authorities do already recognise in hindsight that certain events have been turning points in the process they were involved in. As with the Lorenz simulation, an event becomes a change event because it generates effects and responses in and around a governance process. It is assumed that there are large numbers of events happening in the context of processes, but that only some evolve into real change events.

This could also lead to new insights on managing change events. The difference between events and change events seems to be related to the reactions of and interactions between subsystems active in a governance process. An event can be seen as a stimulus. Its effects, however, seem to be guided by a chain of reactions. If this happens, the course or direction of a development can be changed. Malcolm Gladwell (2000) calls this ‘tipping points’, moments in history where a trend is reversed without a clear change agent and a clear steering activity. One example is the toppling of crime figures in US neighbourhoods, leaving policymakers puzzled about the cause of this major change. Gladwell notes that tipping points, despite their variations, share a basic underlying pattern of contagious behaviours: an event resonates through the system that increases (or decreases) the impact of the event. In port systems, the introduction of the container, in fact just a box for freight, has in a sequence of reactions generated transport chains that are completely adapted to the format of containers, including ships, quays, cranes and freight trains. Summing up our first insight, then, out of the endless population of events, some events can transform into change events that have an impact on the course and direction of governance processes.

### 5.2.1 Sources of Change Event Occurrence

There have been several attempts in the literature to distinguish between categories of events in order to increase our understanding of why events can have an impact. Nelson and Winter (1982) distinguish between random, unpredictable and deliberate events as outcomes of a search process. Random events are not just unpredictable but their roots also cannot be traced. It is therefore almost impossible to give meaning to these events and to learn from them for the future. This is not the case with unpredictable events. It cannot be known in advance when they will occur, but when they do, the roots of the event can be traced and can lead to learning processes. In contrast to random and unpredictable events, which simply occur, deliberate events are more or less organized in order to influence a governance process. This, of course, is the attractive part of a theory on change events. Public officials have a reflexive capacity. If they understand system dynamics to a considerable degree, they can also try to influence these dynamics by organizing events. Decisions in this respect can be seen as deliberate

events to create change. If they succeed, a change event is ‘created’. However, as with the other two types of events, decisions do not necessarily have an impact on governance processes. If they do have an impact, they become change events in hindsight as much as this goes for the two other types of events. In fact, unconscious events can be deliberately caused by actors, but without the ambition and notion that they have an effect on a specific governance process, as in the case of the butterfly effect. In complex systems with a large number of heterogeneous actors, agencies may turn out to be the “accidental” creators of change events (Nelson and Winter, 1982; Boschma and Lambooy, 2001). Summing up our second insight, then, events can simply occur without cause, they can occur unexpectedly but with cause or they can be organized. Within all three categories, however, there is no guarantee that they will become change events.

### **5.2.2 The Impact of Events; What can Change?**

Events become change events due to the impact they have. Events can change the constellation of actors and action systems, the issues that are taken into consideration and also the institutional context in which governance processes evolve. The course and direction of governance processes will be guided by the variation and change in actors and goals that are included or excluded from a governance process. This issue of boundary judgments has been mentioned earlier in this book. It is important to emphasize here that events can generate changes in boundary judgments. The course of processes will also be guided by changes in the agenda and scope of a governance process. Events can open up or close the agenda and scope. They can also change the institutional context in which processes evolve. For instance, the context can become more (inter)national, regional or local, more business-like or public, or dominated by economic or environmental issues. In all cases, processes will have to find a new match with these contextual changes. Events can change the action system, its agenda and its context. All of these changes can have an impact on the course and direction of governance processes.

### **5.2.3 Response as an Important Part of Change Event Generation**

The first three ideas already mentioned have focused mainly on events and how they can have an impact. The assumption remains, though, that the complete transition from an event into an important change event will have to take place in the action system itself. The way in which events are responded to is a part of the whole idea of a change event. The metamorphosis of an event into a change event seems to result from the event and the response from its recipients. As evolutionary economic theory states, actors can act outside an event itself. Thus, after every event there is room to manoeuvre. Actors have the ability to make sense of events and to respond and adapt to events in a self-chosen way. Actors in complex systems have

the potential to select certain events and ignore others (Braybrooke, 1964; Daft and Weick, 1984). In doing so, they can transform events from the unmanageable into the manageable (Flood, 1999b). However, there continues to be a lack of knowledge about this responsive element of change events. Gladwell's notion of the tipping point teaches us that an event can only evolve into a change event if it is followed by a chain of reactions. In these reactions, the initial event can be transformed to take on a new meaning. Summing up our fourth idea, then, events can transform into change events if they generate a chain of actions. Events can therefore be viewed as potential energy for the action system to give direction to the governance processes they are in. Sometimes an event will bring in new agents generating changes, sometimes it will bring in new ambitions or solutions and sometimes it will bring in new rules of the game. In all cases, however, events are important. The authors will therefore argue that the management of events as well as the management of events into change events are important elements in governance processes.

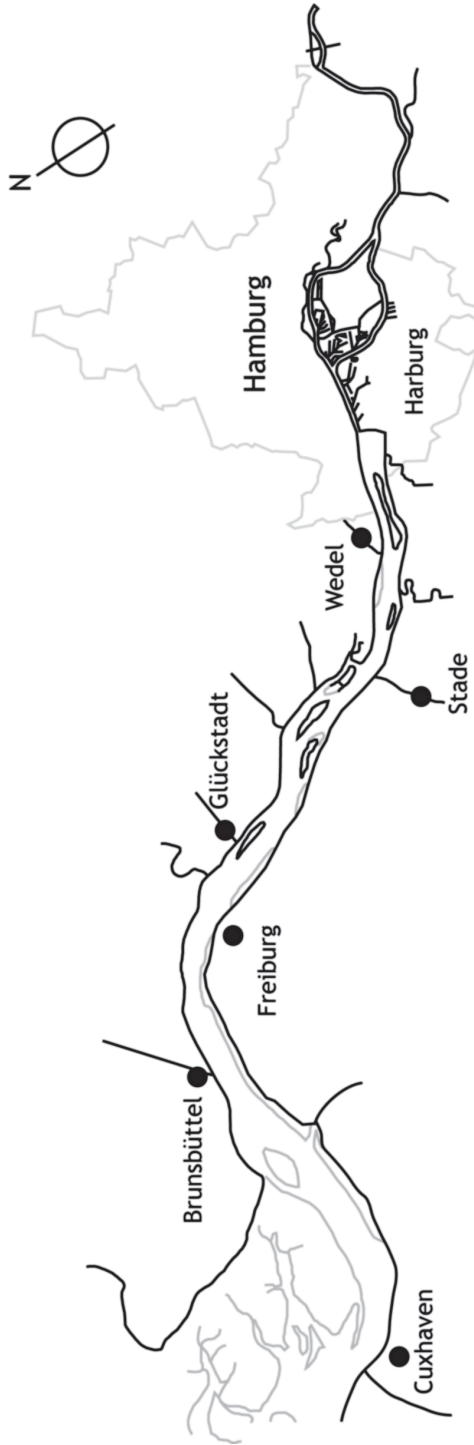
The cases studies to be discussed in the next two sections aim to increase our understanding of the properties of events beyond the observation that they are unforeseen, difficult to predict and therefore hard to manage. It helps us to distinguish patterns of transformation from event to change event. This pattern reconstruction may lead to a better understanding of the evolutionary character of governance processes (as presented in Chapter 3) and the requirements and challenges this poses to public management (as will be elaborated upon in Chapters 10 and 11).

### **5.3 CHANGE EVENTS IN TWO GOVERNANCE PROCESSES IN HAMBURG**

Hamburg is a large container port, achieving a growth rate of about 8 per cent annually. This growth puts pressure on the port authorities to upgrade and expand the port facilities. The authorities and the City of Hamburg regularly propose upgrades such as new quaysides and terminals. Recent plans include the deepening of the navigation channel in the Unterelbe and the construction of a highway link to facilitate the growth in road-bound transport. These two initiatives will be discussed in order to illustrate how these processes of upgrading the harbor are guided by change events.

#### **5.3.1 The Deepening of the Unterelbe**

The Unterelbe is a tidal river and an estuary linking the port basins in Hamburg with the North Sea. Containerships must pass this river before they can reach their terminal destination. The river is about 150 kilometres long and cuts across three German federal states: Hamburg, where the port is located, Niedersachsen and Schleswig-Holstein (see Map 5.1). The current



Map 5.1 Unterelbe



depth is deemed insufficient for current ship designs. The port authorities fear that ships that extend deeper and broader into the water will not be able to enter the port at all. This could hurt the position of the port in relation to other ports in Europe. In order to maintain a strong position, the port authorities and the City of Hamburg pursue a deeper Unterelbe (see also Chapter 8).

### *The Decision to Deepen (t=0)*

As with other rivers in Europe, the Unterelbe has increasingly been reshaped into a means of transport as the port has continued to grow. In the last 20 years, this approach to the Unterelbe has been confronted with rising societal protests, first by citizens groups who feared that deepening would undermine the safety of the dykes and later by citizens who also became concerned about the natural quality of the estuary. These are important societal events. However, the course and direction of harbor development were not affected by these events. The protests were perceived by the harbor authorities and the City of Hamburg to have unrealistic demands compared to the need for competitiveness. The events were also not perceived to be powerful enough to change the existing paradigm and practice of ongoing growth.

The decision to start a procedure for a new deepening in 2001 by the Hamburg Port Authorities, the Federal Water and Shipping Administration and the City of Hamburg was, in this context, just another organized event in the existing course of decision-making. At that time, the monitoring process of the previous deepening had not yet been completed. The decision was made without deliberating with social resistance groups, without completing an environmental impact assessment and by surpassing formal complaints filed during the planning procedure. In this respect there was a clear sense of the relevant action system and its boundaries. Environmental issues were a minor concern for the central actors in the action system.

The dredging works themselves were begun before the formal permit was issued. The reasons for this vigorous management style are not quite clear. On the one hand, it seemed as if the authorities assumed that environmental issues were inferior to the need to accommodate growth (the central port governance paradigm). On the other hand, they seemed to be hurrying because of a fear of delays. The actual dredging, however, became an event with important unintended and unexpected consequences.

The dredging strategy of the port authorities was to place dredged material back into the Unterelbe, where it was supposed to be transported to the North Sea. While the deepening was realised, however, unexpected morphological changes occurred. The tidal range between high and low tide in the Unterelbe increased. As a result, twice as many sediments accumulated in the harbor basin as before the dredging. This was caused by the tidal pumping effect, where sediments are transported upstream rather than downstream. The people living along the river were averse to the changes

in the tidal range. These fears fueled their existing resistance. The high tide affected citizens' feeling of safety. Although the dykes had been reinforced, people feared that they would not be strong enough. People living in the inner city of Hamburg could literally see a combination of both extremes: at extreme low tide, the former port basins in the inner city felt dry and the basins were filled with sediments. Besides the people along the river and in Hamburg's inner city, sports boat owners could not leave the inner ports along the river at low tide and started to complain to the authorities. Finally, environmental pressure groups were worried that the increase in tidal range and sediment accumulation would have disastrous effects on the natural habitat in and around the river. The following is a characteristic remark from one of the pressure groups:

“We were surprised by the size and impact of the morphological changes, but we had expected part of this, if the port, federal and city state authorities would not have ignored us in the previous stages, they would not have to deal with the severe resistance right now. We would probably have concluded that we were all surprised, then we would have looked for joint-actions”. (Interview quote)

The intensity of the morphological changes was unforeseen for all actors in and outside the harbor action system. Even opponents who had warned against the negative effects were surprised by the intensity of the morphological changes. This event intensified and supported existing societal concerns over safety and ecology. The pressure on the tripartite harbor governance action system increased. Nevertheless, the harbor officials continued to get the work done. They were applying a conservative autopoietic approach (see also Chapter 6), even skipping procedures and denying external demands. A radical event then occurred, that altered the effectiveness of the port authorities' approach, but did not directly change the course and direction of the port strategy.

In a more indirect way, however, it began to have an impact, transforming that event into an important change event in hindsight. The increased societal resistance required a rethinking of the governance approach. The tripartite port management decided to become less dismissive towards the protesting citizens. Instead, they now adopted a stakeholder approach in which environmental pressure groups, fishermen, citizens, municipalities and regional governments were invited to share their concerns with the port management. This process began in 2005 and was concluded during the autumn of 2006. However, it was not clear at all whether this was part of an approach to speak with people but stick to the strategy or whether it was an attempt at a more adaptive and dissipative approach aimed at balancing growth ambitions with environmental issues.

The management established a working group of officials from relevant authorities that was asked to design a long-term vision that would take

into account the physical and social issues in a more comprehensive way. The results of this project included ideas about joint governance and nature development. This indicated the emergence of a real change event.

The proposals from the working group were not implemented, however. They were presented by the harbor authorities as long-term plans that were relevant for the future, but not applicable to the short-term strategy. This distinction between long-term adjustments and short-term actions was made in order to shield the current processes from delays. In cases such as this, officials attempt to manoeuvre around external events in order to keep course and speed in the process. Sometimes they succeed, but in several cases, including during the second round of the West Coast Main Line (WCML) discussed in the previous chapter, they achieve the opposite. If they succeed, the event does not transform into a change event. However, if they fail, an event can become an important change event.

The stakeholder approach and the working group report did not transform the event of sedimentation into a change event for the upgrading strategy in the Hamburg harbor. The harbor authorities were able to rebound the pressure generated by the sedimentation into a compensation fund to compensate for damage to the dykes and a promise to dredge small ports for recreational shipping. With these compensation arrangements, the management assumed they had reduced the resistance of the municipalities.

Nevertheless a real change occurred when the management did not meet the dyke safety requirements. The municipalities, the state of Niedersachsen and environmental groups concluded that their concerns had not been adequately addressed. As a result, the governance process stalled. In other words, to explain it in terms of the theory of dynamics, the process took on more and more characteristics of inertia. Even though the direction of the harbor upgrading strategy had not changed, the development of the strategy had stagnated. An event had turned into a change event, not changing the direction of the harbor strategy but halting its ability to make progress.

### 5.3.2 A252 HafenQuerSpange

A second case in point is the improvement of the road connections. For more than 50 years, the authorities in Hamburg had been preparing a highway that linked the terminals in the west to the hinterland connections in the east and south. The Hafenuerspange (HQS), as this cross-port connection is called, was meant to develop this missing link in the Hamburg port road infrastructure. The HQS was planned to be about 8 kilometres long and would include a bridge or tunnel in order to cross the Southern Elbe. This HQS has so far never come to fruition because of the high costs of producing such a link—even though the current network of roads around the port is already congested.

In 2003, the federal Ministry of Transport published a policy document containing all major infrastructural plans in Germany until the year 2015.

This plan defined the HQS as a project for the long run, which means that funds to construct the road before 2015 had to be found elsewhere. The Chamber of Commerce, the Port Authority, a number of private enterprises and the City of Hamburg attempted to alter the status of the HQS in the Federal Transport Policy by renewing the prognosis on the development of the turnover in the port of Hamburg. By doing this the regional actors in the harbor action system hoped to create a change event for the Federal Ministry. They hoped that the new prognosis would develop a sense of urgency with regard to the HQS. This event, however, did not manage to become a real change event. The new growth rates of the annual turnover in the port of Hamburg did not make a deep impression on the Ministry and it did not change its attitude towards the funding of the HQS. The Ministry was as self-referential as the harbor authorities themselves were with respect to the environmental issue. Each government agency seemed to cherish its own order and scope. However, at the same time, a small step in a potential transition from event to change event had occurred as in the previous case. The status of the project was changed into the formal formulation “further need, with the federal authorisation to conduct planning activities”. From that moment on, the harbor governance coalition was allowed to go on with the planning of the project. Thus, although the priorities of the federal government did not change, the harbor coalition was allowed to look for additional financial means. While the scope and ambitions of the federal government had not changed, the regional room to manoeuvre was extended. From their perspective, making a new prognosis was a real change event: “We can now finally start the planning for the highly important road link, our input on the renewed transshipment prognosis has been crucial in the interrelations with the ministry of Transport” (interview quote).

The harbor authorities assigned a team that had to explore whether the HQS could be realised, without sponsorship from the federal government. The team developed a governance model to transfer the construction, maintenance and operation of the HQS to a private concessionaire. The Port Authority offered its help to the team and the Chamber of Commerce submitted a proposal to finance the HQS on a fifty-fifty basis between the City of Hamburg and user fees. During the first few months of 2002, the different actors decided that the concessionaire could be published under the financial conditions proposed by the Chamber of Commerce. This is still not a change event, however, in terms of building a new transport link.

An intervening event occurred in 2002, in which the city-state elections generated a political shift in Hamburg. After decades of Social Democrats (SPD) cabinets, the Christian Democrats (CDU) took over. The CDU presented a growth policy for the harbor. Both the deepening of the Unterelbe and the ‘Sprung über die Elbe’, or Leap across the Elbe, program are a part of this new strategy. A change event has now occurred.

The core of the Leap project was to link the city centres of Hamburg and Harburg, a city on the southern banks of the Elbe in such a way that both

became a single metropolitan area. In order to link these areas, the Elbe Island between the North and South Elbe had to be crossed. This island would become the main redevelopment area. The Ministry of City Planning established a project team for the Leap project.

However, the planned area for the Leap partially overlapped with the planned area for the HQS. The citizens on the island were already against the HQS, but did not have many avenues to become involved in the process of planning the HQS. The initiation of the Leap across the Elbe gave them a powerful possibility to oppose the HQS more effectively: the HQS did not fit into the ambitions of the Leap across the Elbe project. This opposition was reinforced because several actors (among them the Ministry of City Planning, local politicians and architects) started to support the arguments of the citizens on the island. They regarded the HQS as a major obstruction to the sound redevelopment of the Elbe Island. The initiation of the Leap across the Elbe project therefore resulted in more active resistance against the HQS. First the elections changed the agents and scope of the Hamburg action system. New projects were prioritized leading to new conflicts with the existing HQS aspirations.

“Now we are confronted with resistance (even in our own public circles), we have been hoping for 50 years we could start the planning of the HQS and then this sudden change of political course confronts us with a project that had not been on the agenda before”. (Interview quote)

“Beforehand we were strongly against the HQS but we did not get any formal position and had to wait for the procedures. With the Leap across the Elbe, we succeeded to convince public actors of the problems the HQS could give with regard to the plans for the development of the Elbe Island”. (Interview quote)

The initiation of the Leap across the Elbe confronted the HQS project team with more varied stakes and opposition. The people of the Elbe Island united in an association and consolidated their resistance against the HQS by building a coalition, with even governmental agencies becoming involved. This generated a repositioning of the Ministry of City Planning. Nevertheless, the project team with people from the Ministry of Economic Affairs and the Port Authority continued to stick to their ambitions with respect to the HQS. A conflict between two city-state ministries was about to arise. The citizens on the island also proposed the organization of an international workshop on Transport and Traffic. The platform received much support, and it started a lobby with the SPD and an alliance of green parties called GAL. The coalition of these actors proposed alternative solutions to limit the negative impact of the HQS. The HQS project team continued to push forward with the original plan for the HQS, however. The

city-state granted a concessionaire to a developer parallel to the planning procedure that began in 2007. The planning focused on the HQS and not on alternatives. This case illustrates the rise of important events that transform the landscape in which the ideas for the HQS have to be realised. However, it remains open which of these events really will become crucial change events.

## **5.4 CHANGE EVENTS IN THE DYNAMIC PORT GOVERNANCE OF ROTTERDAM**

Rotterdam has the largest port in Europe. Its location and open access to the North Sea make the port highly accessible. About 450 million people live in the hinterland of the port. Every year 30,000 sea-going vessels and 130,000 hinterland barges call at the port (2005). The port is situated in the southwest of the Netherlands and covers an area of 10,500 hectares. It grows at a relatively steady pace of about 3 per cent a year. In order to accommodate growth, physical changes are required. Therefore, the Port Authority is constantly planning for upgrades. Two recent plans include the port expansion Maasvlakte II (MV II) and the restructuring of an old harbor area between the City and the Port (CityPorts). The events and change events in these two cases are elaborated upon in this section.

### **5.4.1 Maasvlakte II**

MV II was introduced in 1993 as a way to deal with the expected shortage of harbor area (due to continuous growth in transshipment) in the port of Rotterdam after 2020. The Port Authority and the Dutch Ministry of Transport initiated the idea to build a harbor polder in the North Sea. The area is located in the western part of the port (Map 5.2).

#### *Change Event One: A Joint Plan*

A departmental project organization was founded. The urgency of the expansion was researched with the involvement of a broad variety of actors (public, private, pressure groups). The different actors can be categorised into proponents and opponents of the MV II. The Ministry focused on the realisation of the MV II, whereas environmental pressure groups tried to include thinking about other alternatives (such as no expansion or expansion in the hinterland or to other Dutch ports). The search process, however, was organized around one alternative initiated by the ministerial project team (MV II). This was criticized by environmental actors, who suggested that there was no real search for alternatives. The tension between economic and environmental stakes is crucial in this process.



Map 5.2 Port of Rotterdam

Despite several attempts to mediate between the two sides, the conflict and inertia prevailed for a long period of time. At a certain point, however, a new approach appeared on the stage. This intended event was labelled as the vision and heart meeting. The municipality of Rotterdam invited several environmental pressure groups to submit ideas for natural compensation, linked to the MV II port expansion. From that moment on, the environmental stakeholders were involved in the expanded governance process. Not only growth, but environmental qualities were now a part of the process. It is important to acknowledge that the vision and heart event was organized parallel to the MV II realisation process, and managed to combine the environmental and economic goals. Finally, the ideas of the environmental groups were translated into measures for ecological development (750 hectares of natural areas south of the city of Rotterdam). The actors were satisfied with the representation of their goals. They jointly drafted the documents required in the planning procedures and completed the procedures in early 2006. This event, a set of meetings, resolved the impasse between the environmental and economic stakes. In this way, it is a splendid example of an intended event with an intended result and can therefore be labelled as a change event. This case also provides evidence that the impact of change events can be challenged in time.

### *Change Event Two: Rejection by Council of State*

After accordance in the Dutch Cabinet and Parliament in the summer of 2003, all stakeholders inside and outside the governance process were legally allowed to oppose the plans. Several, mostly excluded, actors (farmers, fishers, environmental groups and individuals) utilized this opportunity. The Council of State valued the objections and decided that they were doubtful about some of the research on the environmental aspects, such as the impact on fishing areas and the effects on farmers owning grounds in the areas designated for natural compensation. Consequently, the Council of State rejected the plans in January 2005. This is a good example of an event that was not at all intended by the managers of the governance process. Even in hindsight they see it as an uncontrollable event generating inertia.

“This event causes at least a delay of two years. To be honest I would really not know how we could have managed the process to get the project past the Council and even more worrying I have no clue how we should proceed the process to finally realise this highly important project”. (Interview quote)

The change event was as much of a surprise as if it came from another world. The fishermen and farmers had not been participating in the port action system before. This led to emotional reactions in the harbor action



system, with actors not knowing how to proceed. They were astonished by the new system boundaries they had to take into account. After a few weeks, the actors began to respond to the new situation. The project team developed a strategy to deal with the rejection. The Ministry of Transport initiated additional research into the effects of harbor extension on the fishing system. In October 2006, the government accepted the new plans and submitted them to Parliament. Local and national politicians accorded the new plans. A new round of juridical testing began and the Council of State was in a position to create a new event.

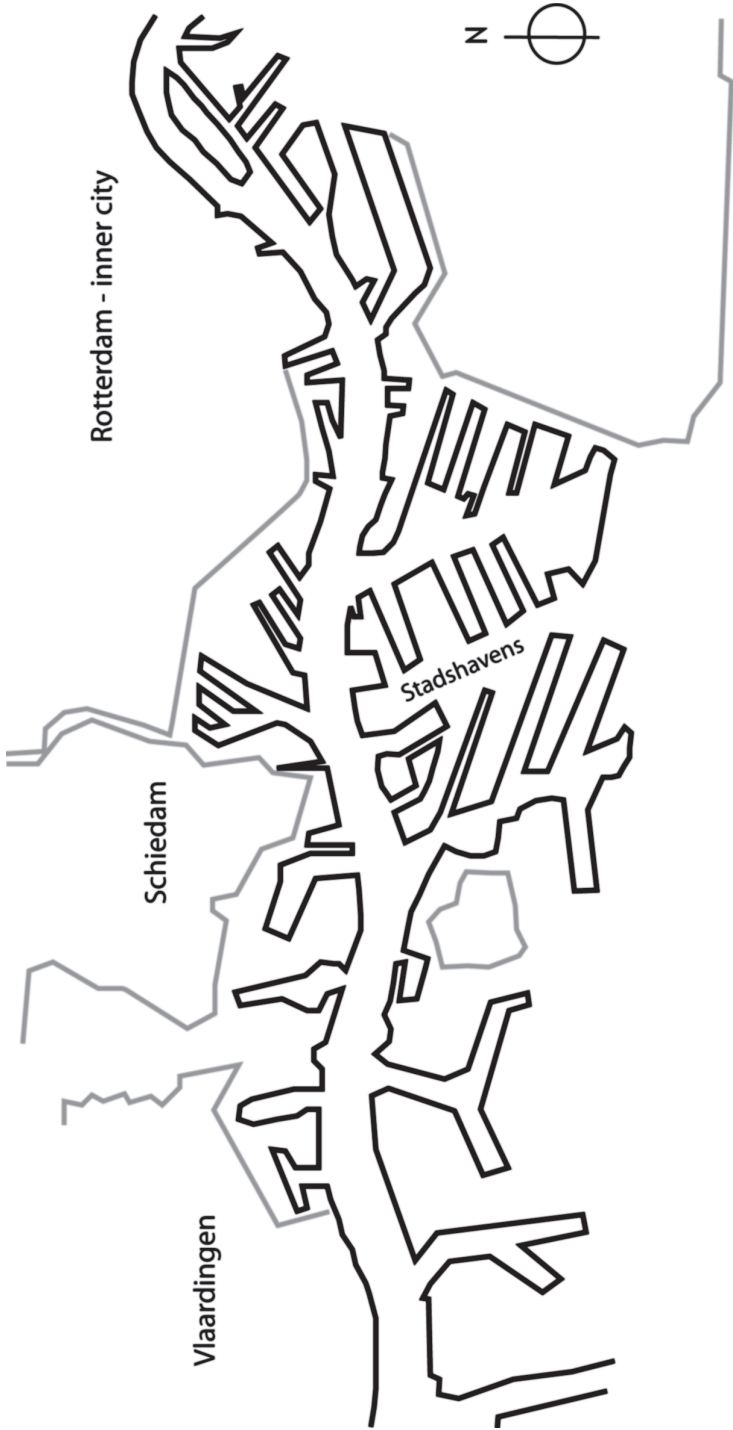
This case teaches us that events can be obstructed by new events and that new events can be generated by actors in quite different action systems, some of whom are only very loosely linked to the action system of harbor upgrading. Nevertheless, these worlds can be confronted with one another by way of a Council of State applying new European laws that have nothing to do with harbor systems.

#### **5.4.2 CityPorts Rotterdam**

While the port of Rotterdam slowly ‘moves’ to the west, the authorities are looking to redevelop old sites in the east closer to the city centre. CityPorts is one such port and consists of four smaller havens on both banks of the river Maas (see Map 5.3).

Within both the city planning departments and the Port Authority, the CityPorts area had been under study for a few years before 2000. Both actors had diverging goals (develop the port, develop the city), and did not succeed in reconciling them. No short-term plans could be developed. The only progress in the governance process could be achieved by talking about possible transformations in the long run, i.e. 2030. This is a well-known strategy in cases of conflicting ambitions. It seemed as if the CityPorts project would not see much progress in the next few decades.

This expectation was challenged, however, by events that took place far away from the CityPorts project, namely in the MV II action system. The Department of Transport was perceived to be the prime financier of the MV II project. In contrast to former subsidies, the minister now decided that he was only willing to finance the project in return for a fair share of the revenue. The Ministry therefore received 33 per cent of the shares of the Port Authority in exchange for the money. The Municipality of Rotterdam, as the former owner of 100 per cent of the shares, was not amused. In order to compensate the Municipality for the loss of their shares, it acquired the right to start redevelopment in the city port area for urban use. Part of the deal was that the Port Authority, which until that moment was against the transformation of the area, would cooperate. This package deal can be seen as an important event. It was not intended by the CityPorts initiators, but by accident became part of the package deal. Nevertheless it energized the redevelopment process considerably. This would not have happened if the



Map 5.3 CityPorts

Minister of Finance, for completely different reasons and probably without any knowledge about CityPorts, had not decided that he wanted a stake in the shares of the Port Authority.

“The city port was the change in the deal between port and municipality in which the municipality sold part of their shares in the port and got the project area in return”. (Interview quote)

The redevelopment strategy was developed enthusiastically. The City Departments and the Port Authority initiated a joint Development Company (January 2004). The Development Company had to establish a development strategy and explore the economic possibilities. It began to collect information and relevant studies as well as consult the actors in and around the area. The information was gathered and eventually written down in the Development Strategy. The first draft was used as a background document for consultation. Meanwhile, the Company began to acquire funds, especially from the Ministry of Spatial Planning. Transforming an old harbor area into a city area is costly. The Company and Ministry thus worked on a joint proposal for funding.

### *Change Event Two: Rejection of Maasvlakte II*

However, things changed again. Just as the process was energized by the decision of the Minister of Finance and the package deal that resulted from his interest, it now became stagnated due to decisions in that same MV II action system. The rejection of the MV II by the Council of State in January 2005 not only generated despair in the MV II action system, it also activated a rethinking of the strategy by the Port Authority. If the new polder was not a possibility, large portions of the CityPorts area would be required for port development. The conflict between the urban redevelopment goals of the municipality and the harbor development goals of the Harbor Authority was heavily intensified by the rejection by the Council of State, even though it is rather implausible that the Council was at all conscious of this effect of their rejection. This is a good example of an event with high, but also unintended, consequences in another part of the action system.

The repositioning of the Port Authority can be seen as a more or less enforced effect of the rejection. As a next enforced effect in a chain, the City Departments had to reconsider their plans and ambitions.

“Our former colleagues of the Port Authority who proposed this project have now deliberately stopped the project, although this feels badly, the backgrounds are obvious, but who could have foreseen the rejection of the Maasvlakte and even more who could have predicted the effect on city ports of the rejection”. (Interview quote)

The unintended outcome of this chain of events was the death of the Development Company in 2007. The similarities between this and the end of Railtrack in the WCML case are striking. Although the death of the Company was not intended by anyone, it nevertheless was the final result of the process. A municipal project team took over the tasks of the Development Company focusing on the northern part of the CityPorts area and two old port basins closer to the city centre of Rotterdam. This was all that was left from the great expectation of CityPorts revitalization. The rest will remain as port areas. The dramatic reality of governance processes in complex systems could not be illustrated better. Each actor, including the Minister of Finance, Council of State and Harbor Authority, makes decisions generating events that together evolve into results not intended by anyone.

## 5.5 THE ERRATIC TRANSITION OF EVENTS INTO CHANGE EVENTS

All four of the previous case studies show how governance processes evolve in a dynamic and indecisive way. The processes are, in line with the insights gleaned from the cases of the WCML and Betuweline presented in the previous chapter, guided by a variety of actions and interactions. In such a complex system, many events will occur. A substantial majority of events do not seem to have much effect on the course and direction of the four processes we have elaborated upon.

However, the evidence also suggests that seemingly small events may trigger crucial changes in the direction and course of existing governance processes, such as the deepening of the Unternelbe, improving transport infrastructure and upgrading city areas like the Elbe Island and City Harbors in Rotterdam and building new harbor polders. Stable development is not the most accurate way to describe these governance processes. Stagnation, dynamics and the vaporization of ideas, actions and process development can easily occur. In the cases presented earlier, all four governance processes are characterized by periods of stagnation. Furthermore, interesting new ambitions about upgrading former harbor areas appear on the stage, but also vaporize within a short period of time. Finally, several of the processes become more dynamic due to a combination of scope widening (economy and environment; harbor and housing), changes in the boundaries of action systems generating new configurations of agents and context changes. This chapter highlighted one source of influence that is normally underexposed in theories on decision-making and regional development, i.e. events.

As was already indicated in the WCML and Betuweline cases in the previous chapter, and illustrated again in the two harbor cases discussed in this chapter, changes take place in the context of the projects that are

initiated. The evidence shows that non-human events, such as the sedimentation swing in the Untere Elbe, can become change events. Physical systems can react in an unexpected way. Human events can also have an impact. Some of these events have a well-known cause and can be predicted in terms of appearance. The most important examples of these are elections. Elections as predictable events can, as was indicated in the Hamburg cases, bring in new agents who change the agenda and elevate the importance of societal groups. However, not every election will develop into a change event and, more importantly, a predictable election that leads to a sometimes less predictable government change does not necessarily generate predictable outcomes, as shown in the Hamburg case. All this justifies the focus on events and the transformation from event into change event that actually redirects the course and direction of governance processes.

Seven intended and unintended events have been presented in four different cases in two important harbors in Europe, Hamburg and Rotterdam (Table 5.1).

The five unintended change events that have their origins in the issue system and the context do provide proof for our arguments from complexity theory that coincidences happen to be important guiding principles in complex systems. Much happens without a deliberate intention to enforce or to disrupt a certain governance process. However, this still occurs on a rather regular basis. The case of the Elbe deepening even shows how the management dedicated to timely decision-making in line with decisions made in the past (linearity) contributed to physical dynamics and resulting social dynamics. Thus, attempts to control a process can easily lead to the opposite effects than those intended. The rejection of the MV II by the Council of State was a surprising event for many actors. This happened because the actors committed to a governance process did not interact with these external actors, despite the fact that they clearly played a crucial role in the process (and vice versa). The rejection was based on objections made by farmers and fishers and dealt with a much wider action system than the MV II project. This much broader system boundary judgment surprised the supporters of the MV II.

*Table 5.1* Intended and Unforeseen Change Events

<i>Unforeseen</i>	<i>Intended</i>
CityPorts: Financing of MV II	HQS: Decision to alter status
CityPorts: Delay in realising MV II	MV II: Vision and Heart
HQS: Initiation of Leap across the Elbe	
Elbe Vertiefung: Morphological changes	
MV II: Rejection by Council of State	

Two events are intended. If events are important guiding elements in how governance processes evolve and if the management of events is an option for managers and officials initiating governance processes, it is of great importance to develop insights into how intended events work out. Intended events provide actors with the ability to consciously influence a process toward their preferred direction. This chapter has shown that these kinds of events do exist. However, it has also been shown that the effects of intended events are as unpredictable as the effects of unintended events. Intended events have anticipated as well as reverse effects, depending on the reactions from others. In each action system, and definitely in its context, there are actors not committed to the course and speed the initiators in the processes have agreed upon. The unknown reaction of these actors on organized events will in general cause unforeseen consequences. The decision to transfer the HQS into the regional action system created room for the regional parties to manoeuvre in favour of the HQS. However, it also made the HQS a playing ball of the dynamics in the regional system. After a regional government shift, the HQS was suddenly confronted with a whole new and less supportive action field. Vision and hearts can be seen as an important change event. It opened up the action system and was able to bring contrasting ambitions together. This can be perceived as an important breakthrough. Nevertheless, much of its appeal and energizing effects on the development of the process evaporated the moment the Council of State rejected the compromise. A change event was thus confronted with a counter event, creating delays. This example supports the idea that governance processes can be effectively considered as a row of events. Some of these events will guide the process for a while, but new events will challenge this impact and disturb the course and direction of the governance process again.

The discussion of change events in this chapter indicates once more that governance processes cannot be isolated from other processes in their context. All unintended change events originate from the surroundings of the governance process. It seems that even change events that take place further away from a specific process can have as much of an impact on governance process as direct management and guidance or events in the process. This insight is in line with the observation made in the previous chapter that the EU legislation on a safety system for railways (ERMTS) and highway tunnels had more impact on the process of upgrading the WCML and on building the Betuweline than many of the management activities within the project team itself. This does not challenge the importance of project management. Rather, it adds to it the idea that the management of events is also of importance.

Finally, the evidence showed that the transformation from events into change events is guided by the response to that event rather than by the action system itself. Change events only become traceable in hindsight. Some events have intended consequences by actors and can be controlled

to a certain extent. Managers, however, can also be surprised by events intended by actors not managing the process but participating in the action system in which the process takes place. Often 'external' actors can generate events that disrupt the process. Managers who are not aware of this easily perform intended behaviour that creates non-linear dynamics in the process that they clearly had not intended. The next chapter focuses on the response to developments in terms of conservative or dissipative self-organization.

# 6 Metropolitan Regions as Self-Organizing Systems

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Geert R. Teisman, David Byrne*

## 6.1 INTRODUCTION

Several authors (Portugali, 1997; Lombardo, 1998; Byrne, 1998) have argued that self-organization is a crucial element in the development of metropolitan regions, and one that has been too often neglected by scholars in public administration. The concept of self-organization questions the guiding ability of single governmental agencies. Allen (1996) and Byrne (1998: 149) have argued that governmental decision-making in complex societies does remain possible, however, but that the effects of governmental actions are highly influenced by the spontaneous actions of many other agents.

This underlines the importance of understanding the concept of self-organization. Allen (1996: 71) explains the character of self-organization as such:

in a complex system of interdependent entities the decisions made by individuals, or by collective entities representing certain localities, lead to the emergence of large scale structure, which is not anticipated in their thinking, and which later will in fact determine the choices which are open to them.

According to Allen, spatial structures of cities, regions and urban networks emerge from the continuous interaction between individuals, their goals, their aspirations and the macrostructure that they have allowed to emerge. As Stacey (2003: 264) argues: “new directions for an organization emerge from both their [managers’] choices and the patterns of responses these evoke from others in a self-organizing way.” This chapter explores the concept of self-organization to understand the way in which metropolitan areas develop and attempts to improve our understanding of how different types of self-organization can reinforce or weaken governmental action.

Section 6.2 elaborates on the concept of self-organization and distinguishes between conservative and dissipative self-organization. This results in a conceptual framework for analyzing the self-organizational character of governance. This framework is applied to metropolitan governance, and



more specifically to recent governance practices in the metropolitan region of Randstad Holland: a polycentric urban area consisting of cities such as Amsterdam, Rotterdam, The Hague and Utrecht. Based on this analysis, conclusions are drawn about various appearances of self-organization in governance systems and the possibilities for steering.

## 6.2 A THEORY ON CONSERVATIVE AND DISSIPATIVE SELF-ORGANIZATION

Self-organization is guided by local interaction, not by the imposition of any external or internal actors (Cilliers, 1998; Heylighen, 2002; Jantsch, 1980). Because all actors are part of the system, control over the system is distributed across many actors (Heylighen, 2002: 8). Metropolitan governance is a result of a variety of self-organizing actions. Dynamics in metropolitan systems and metropolitan governance processes is therefore quite common. The previous chapters have already demonstrated the existence of non-linear dynamics in governance processes.

This chapter focuses on the contribution of self-organization to metropolitan governance processes. When applied to management issues, the notion of self-organization is derived from an autopoietic<sup>1</sup> stream of thought—often focused on organizational closure (see Chapter 2 in this volume; Kickert, 1993; Dempster, 1998). On the other hand, the concept of self-organization is inspired by Prigogine and Stengers' (1984) idea of dissipative structures that focuses on the “property of complex systems which enables them to develop or change internal structure spontaneously and adaptively in order to cope with, or manipulate, their environment” (Cilliers, 1998: 90). The latter is, for instance, uttered in the development of strategic alliances between different organizations in a complex system (Koza and Lewin, 1999; Pyka and Windrum, 2003). Urban regime theory (Stoker, 1995), like several theories about metropolitan governance, acknowledges this type of self-organization. These theories reflect self-organization as opposed to an organization perspective and emphasize its dissipative capacity to build vital coalitions.

In a complexity theory perspective on self-organization, a distinction is acknowledged to exist between conservative and dissipative self-organization (Jantsch 1980, 1981; Probst, 1987; Heylighen, 1989; Van Olffen and Romme, 1995; Schweitzer, 1997; Dempster, 1998; Wible, 2000; Fuchs, 2002; Farazmand, 2003; Mitleton-Kelly, 2003).

Before further analyzing the concept of self-organization, two issues that are often raised in the discussion of this concept should be clarified: the relationship between self-organization and organization, and intentionality in organizing. The perspective of organization has dominated the social sciences for a long time. It depicts organizations as continuous and relatively stable structures. Actors participating in these structures are

perceived to collaborate under the assumption that by working together, they will achieve more than by working alone. Human actors are considered to have an inclination for control and planning, and steering is deemed achievable to some extent. Dobuzinskis (2006) argues that, in a sense, it is true that bureaucracies are not self-organizing, but he acknowledges that in a postpositivistic public administration this objection may not be irrefutable. Complexity theory argues that in essence, all structures in complex systems are self-organizing (Jantsch, 1980). Lombardo (1998) explains that in situations with many perturbations, which is the case in complex systems, the property of self-organization reveals itself to the observer, leaving the organization perspective of diminishing importance. Plans and goals arising from existing hierarchical organizations, however, may seem rather intentional. Tschacher and Haken (2007) explain that these 'intentional' plans and goals are synergetic pattern formations that are based on the phenomena of self-organization (see also Grothe, 1997). Thus, the observation of self-organization in relation to intentional organization seems to be a matter of perception.

### **6.2.1 Conservative Self-organization**

Conservative self-organization comes down to the capacity of a system to govern itself and focuses on the self-referential character of the system (Jantsch, 1980). Schweitzer, for example, argues that conservative self-organization can be observed as processes of structure formation that occur through a relaxation into an equilibrium state (Schweitzer, 1997: xxi). Jantsch (1981) explains that conservative self-organization is about balancing equilibrium between stable and inert system states (see also Chapters 1 and 10 in this volume). Conservative self-organizing systems possess a significant element that remains constant and invariant over time (Wible, 2000), such as organizational structure and patterns of interaction. However, Kickert (1993) states that stability should not be confused with closure of a system: "in social reality, closed systems do not exist. Most social systems are by definition open . . . Strict organizational closure is an unrealistic notion" (Kickert, 1993: 272).

Conservative, self-referential organization allows actors to have a sense of a planned development within the dynamic system they act in (Teisman, 2005). It is deemed to be in the nature of most actors to have a tendency to plan the development of the systems they are a part of, for their own well-being. However, there is also a risk to this type of self-organization. Too much focus on control by actors or organizations is likely to restrict their ability to adapt to developments taking place in their dynamic system. Negative feedback processes in the system will weaken the stimuli provided by the systems' environment. A more or less continual recurrence of these processes could end in static stability and an inert state of the system.

To many, a self-organization perspective to governance means passing out hierarchy. Inspired by the ideas on dissipative structures and the assumption that these structures generate creative and innovative capacity, advocates seem to forget about the conservative character of self-organization. Bootsma and Lechner (2002) have shown that hierarchical organizations are natural phenomena in human systems. Cilliers (2001) argues that complex systems, as a result of their internal diversity, all have a certain hierarchical structure. Conservative self-organization is a main characteristic of hierarchical organizations. Conservative self-organization is focused on the exploitation of existing information and the replication of existing practices (Van Olffen and Romme, 1995).

### 6.2.2 Dissipative Self-organization

The other direction in which self-organization may evolve is referred to as dissipative self-organization, inspired by the discovery of dissipative structures by Prigogine and Stengers (1984). In contrast to conservative self-organization, dissipative structures can be interpreted as being far from equilibrium: “dissipative structures represent a kind of self-organizing dynamic order that maintains itself through continuous exchange of energy with the environment” (Jantsch, 1981: 66).

Dissipative processes are deemed capable of creating synergy between the system and its environment. Accordingly, dissipative self-organization stands for a cooperative quality of organizations (Jantsch, 1981), which is able to instigate the convergence of internal strengths in interactive processes. Leaving room for spontaneity, this convergence may lead to the emergence of new structures and entities, enabling positive feedback between a system and its environment. This process would ultimately strengthen the development of innovative initiatives resulting from the internal system or its environment. In this way, processes of dissipative self-organization are considered to prevent systems from becoming locked in internal processes. Kickert (1993) argues that the idea of dissipative structures broadens the ‘traditional’ understanding of autopoiesis in public administration. Conservative autopoietic systems generate and continuously regenerate the same type of organization, whereas dissipative self-organization is about crossing organizational boundaries and realizing new connections. In contrast to conservative self-organization, dissipative self-organization is focused on the exploration of information (Van Olffen and Romme, 1995), which enlarges its capacity for innovation and creativity. In terms of the system states mentioned in Chapter 1: it brings a system into a situation of dynamics, but without the stabilizing forces of conservative self-organization it also has the potential to cause chaos. Dissipative self-organization has the risk of becoming superfluous, when too many actors in a system go about their activities in a dissipative

fashion, looking for synergy but without the ability to realize their own ambitions, let alone collective ones.

### 6.2.3 Self-organization and its Application to Metropolitan Governance Research

This chapter will apply the described self-organization approach to a specific object of study: governance behaviour in complex metropolitan systems. We want to understand how governments confronted with a large variety of demands and complex governance networks are dealing with this complexity. Governmental actions will be sought out and analyzed in terms of conservative and dissipative self-organization. Four appearances of self-organization are presented through an analysis of cases within Randstad Holland: two with conservative characteristics and two with dissipative characteristics (Table 6.1), which are either oriented on the structure of metropolitan governance or its content.

In the cases discussed, four types of reactions to the multitude of problems the Randstad region encounters can be distinguished. First, there is a discussion with regard to revising the governing structure (one metropolitan authority). Second, there is an inclination to integrally develop spatial projects (A4 project). Third, there are attempts to coordinate on a regional collaborative level within informal alliances and partnerships (North and South Wing case). Finally, movements towards the enrichment of singular (infrastructure) projects to more inclusive (spatial) programs (A4 project) can be identified.

Three issues will be discussed in the conclusion, starting from the assumption from theory that both conservative as well as dissipative self-organization can be identified in complex social systems. First, it will be illustrated to what extent both approaches can be traced back in our case. Second, the effects of these two different patterns of self-organization will

*Table 6.1* Self-Organization and Its Application to Metropolitan Governance Research

	<i>Conservative self-organization</i>	<i>Dissipative self-organization</i>
Structure oriented	Organizational restructuring in order to create a new government in charge Cases: Metropolitan authority and Randstad Province	Building alliances and partnerships in order to create joint agendas and actions Cases: North and South Wing alliances
Content oriented	Creating powerful project leadership in order to carry through plans Cases: The A4 project first phase	Expanding project ideas into joint programs of regional development Cases: The A4 area development second phase

be demonstrated. Finally, the interaction between both occurrences of collective action will be elaborated upon.

### 6.3 THE CASE OF THE METROPOLITAN RANDSTAD HOLLAND REGION

Before elaborating on the nested cases presented in the preceding scheme, this section introduces the main object of research: the metropolis of Randstad Holland. Randstad Holland is a horseshoe-shaped polycentric region in the Netherlands. About six to seven million people live and work in the region, making it one of the largest and most crowded metropolitan regions in Europe. It encompasses the urban centres of Amsterdam, Rotterdam, The Hague and Utrecht; their suburbs; and many smaller cities (see e.g. Jobse and Needham, 1988; Kantor, 2006). The so-called ‘Green Heart’, an agricultural and preserved natural area, is situated in the middle of the horseshoe. The Randstad region and other polycentric areas, like Los Angeles and the Ruhr area, are distinct from metropolitan regions where a single city is dominant, such as Paris and London (Hall, 1977; Kooij and Van der Laar, 2003).

The Randstad was acknowledged as a metropolis in the 1960s (Hall, 1966; Jobse and Needham, 1988). Regulation of urban expansion became an important focus of governments in charge of spatial planning. Urban sprawl was considered to be the actual, but also undesirable, result of the self-organization of citizens and businesses. Governments decided to channel this development into ‘new towns’<sup>2</sup> near the central cities. From an urban planning vision, this was a second best solution. The Department of Spatial Planning preferred the option of housing within existing cities. This option, however, was set aside as being unrealistic, considering the preferences of citizens and businesses. While people moved to the new towns, economic activities remained stationed in the cities. The unintended outcome of this combined process of guidance and self-organization was increasing amounts of commuters (Priemus, 1998; Schwanen et al., 2004), pressurizing the existing mobility system of highways and public transport. This discrepancy between the governments’ intentions to decrease the distance between homes and work and the actual development continues to be one of the persuasive illustrations of the inability to combine guidance and self-organization in a symbiotic way.

Today, metropolitan governance of the Randstad has to grapple with several interrelated issues. Due to urban expansion, cities and new towns have grown closer to one another (Priemus, 1998; Schwanen et al., 2004). The Dutch main ports (Port of Rotterdam and Schiphol Airport) require room and accessibility, often in competition with their surroundings. Also, the



Map 6.1 Randstad Holland

region is faced with a sizable qualitative and quantitative housing demand. In addition, the mobility system is confronted with a lock-in: incorporating new infrastructure is complex since building space is scarce, environmental quality is decreasing and expansion of infrastructure is seen to be incapable of dealing with congestion in the region. At the same time, European rules exert an increasing influence on the metropolitan governance of the area. Furthermore, the Randstad Holland is in fierce competition with other metropolitan regions in terms of its economic attractiveness. In accordance with Florida (2002), regions compete on an international scale in order to attract thriving companies and workers. This competition is also reflected in all kinds of rankings of metropolitan regions such as the annual European Cities Monitor (by Cushman and Wakefield), the Economic Intelligence Unit (EIU), the World Economic Forum (WEF) and the Institute for Management Development (IMD).



*Map 6.2* Governmental Structure of Randstad Holland

### 6.3.1 Governmental Situation

Drawing from this analysis, the Randstad region faces various issues in the spatial context. In the Netherlands, four levels of government are formally involved in spatially developing the region. On the one hand is the national government, within which spatial development is on the agenda of several ministries, mostly VROM (Housing, spatial development and environment), V&W (Transport, Public Transport and Water management) and EZ (Economic Affairs). Also, the Ministry of Finance plays an important role in facilitating development. On the other hand, 12 provinces, of which four are represented in the Randstad, namely, North Holland, South Holland, Flevoland and Utrecht, are responsible for more regional coordination. Third, there are many municipalities responsible for spatial development (reflected in Map 6.2). Fourth, formal collaborative ‘Wgr-regions’ (an abbreviation for regions that result from the law of collective regulations), are responsible for municipality-exceeding issues such as infrastructure (more on these Wgr-regions in the following

paragraph). Although some of these organizations do have responsibilities, they lack democratic anchorage.

Dutch spatial development is fixed by the Law for Spatial Planning. This law commands the division of responsibilities in dealing with spatial difficulties among different governing units. Accordingly, over a hundred municipalities in the Randstad area are responsible for establishing spatial-specific destinations for areas within their constituency, which are then judged by one of the four provinces. These provinces compare the municipal destination plans to their own area plans. In turn, the provincial plans are derived from national strategic spatial plans, which are drawn up under coordination by the national government.

Even though the Dutch planning system is known for its ability to structure spatial development, several studies as well as the analysis of the OECD on the region make clear that the issues governmental organizations have to deal with have exceeded their formal boundaries (OECD, 2007).

#### 6.4 DISCUSSING GOVERNING STRUCTURE REVISION

The variety of metropolitan issues portrayed in the preceding section, such as pressures on the housing market, congestion and competition with other metropolitan regions, means that governmental organizations in the Randstad are posed with a grave task. In reaction to this, in 1966, a strategic note published by the national government stated that spatial arrangement should dictate managerial organization (Van der Cammen and De Klerk, 2003: 217). This implied that administrative entities in the Randstad should cooperate at different levels (Hall, 1977). This note can be perceived as the starting point for administrators to search for the most appropriate governmental structure for the Randstad. The search culminated in the discussions on installing so-called 'city provinces' and a 'Randstad province' as new managerial organizations.

The underlying argument on introducing city provinces was to install a governmental body that would be responsible for the development of conurbations, consisting of multiple municipalities. After lengthy preparation, the instalment of city provinces was planned for the 1990s, preceded by a civil referendum. The plans were, however, upset by an unexpected no-vote by the public, which was afraid of a loss of local identity (Boogers and Hendriks, 2006; OECD, 2007). Coinciding with the civil rejection, frictions emerged among existing governmental bodies. In the case of the Amsterdam city province for instance, forgoing the referendum, the municipality of Almere had been forced to leave the administrative process by the province of Flevoland. The province had been reluctant to lose its most promising municipality and Almere in turn did not want to be overrun by Amsterdam (Van Dam et al., 1996; Van der Lans, 2006). The attempt to install city provinces had led to deteriorated



relations among the municipalities within the conurbations (Salet, 2003). The boundary-exceeding issues, however, remained on the agenda. Eventually, the national government introduced the Joint Arrangements Act (Wgr), in which municipalities were coerced into collaborating on issues such as public transport and juvenile care within so-called Wgr-regional organizations. These regional organizations, working with municipal representatives, are only indirectly democratically anchored.

Where the discussion on city-provinces focused on the largest cities and their surroundings, the second half of the 1990s came with an increasing awareness that the area had evolved into a metropolitan network (Teisman, 2006). This brought forth a renewed structured discussion focusing on the instalment of a Randstad authority: a new governmental structure that in most proposals is predetermined to take over the role of the four involved provinces and some of the authorities of the cities and national government.

With the intention of creating more coordination in the governance of the Randstad, five departments within the national government introduced the 'Administrative Committee Randstad'. In order to collectively interact with this committee the four provinces, the four largest cities and the Wgr-regions started collaborating within 'Regio Randstad' (Storm, 2004). This collaboration involved the coordination of points of view and the regulation of one another's activities. In 2002, the structure of this collaboration became formalized with the establishment of a bureau and a joint regulation. This was all an attempt to create the central node of Randstad governance (Storm, 2004). Responsibilities and influence remained within the existing organizations, restraining this formalization from bringing about a joint approach to Randstad development. Collaboration between the involved actors conversely seemed to decrease, allowing them to focus again on their own objectives (Teisman et al., 2005). Collaboration within the Regio Randstad organization was discontinued after a critical evaluation questioning its capacity to deal with metropolitan issues in Randstad Holland (Teisman et al., 2005).

The instalment of a Randstad authority, however, is continuously debated. In 2002 for instance, the Institute for Inter-provincial Consultation established the 'Geelhoed Committee', consisting of actors from several fields in society. This committee advised the national government to merge the existing 12 provinces into four regions, creating a single Randstad provincial authority.

In 2006, the four largest cities established another committee to provide advice on this issue. This 'Burgmans committee' advised the replacement of the existing provinces and Wgr-regions by one Randstad authority. Also in 2006, the 'Kok Committee',<sup>3</sup> which was installed to research the possibilities of Randstad governance, released their advisory report. Its most quoted recommendation was the establishment of a Randstad province. As with the other advisory reports, this call for a new structure resulted in a cacophony of reactions in the media about different models for a new

governance structure for the Randstad. Eventually, the National Government chose to discard the central recommendation of the Kok Committee, opting for subsistence of the existing structures in the Randstad. However, it is unclear how long the structure discussion will be closed in this region where actors are continuously dealing with boundary-crossing issues.

## 6.5 INTEGRAL DEVELOPMENT OF PROJECTS

### 6.5.1 First Round: Towards Strong Project Management

In addition to discussions on governing structure, another development with regard to Randstad governance deserves attention. Through the increasing scale of spatial developments, spatial projects can no longer be executed by single governmental organizations. This motivates actors to look up new contacts in their attempts at realisation. The project for the realisation of the A4 highway connecting Rotterdam and The Hague is an exemplary illustration of this.

The road was opted for by the province of South Holland in 1952; they wished to extend the highway that already connected Amsterdam and The Hague, generally referred to as the A4/Rijksweg 19. After several years, a policy was established by the national government, making the construction possible. Local municipalities did, however, object to the road, by referring to expected noise pollution and deprivation of the landscape. They proceeded to put a call out to politicians to prevent construction, a call which was successful.

The ministry responsible for roads remained in favour of construction. This was conveyed in their First Structure Scheme for Transportation of 1977. In this way, the road remained on the agenda of the national government, something that also becomes clear when maps of the region are reviewed, as the A4 can be seen to have already been drawn in with a dotted line. Starting from 1993, years of formal decision-making procedures followed, resulting in an official choice by the Minister for Transport to construct the road.

This time too, however, municipalities as well as non-governmental actors did everything in their power to prevent the road from being constructed, and again they succeeded by gaining the support of national politicians.

In 2004, regional authorities, including the province and the Wgr-regions of The Hague and Rotterdam, together with local companies, appealed to the Ministry of Transport to resolve this impasse. Among the requestors was a politician from the Province of South Holland, Marnix Norder, who had also described the necessary conditions for resolving the impasse. This call to action, in combination with improved possibilities for public-private financing, resulted in the Minister of Transport allowing Norder to work out his ideas.

### 6.5.2 Second Round: Towards an Inclusive Spatial Program

Norder made contact with the local municipalities involved (Stuurgroep IODS, 2001: 65). These actors then made clear under which conditions they would agree to the construction of the A4, resulting in a regional collaboration under the name of IODS—Integral Development between Delft and Schiedam. This plan, which was the result of a collaborative effort among the different actors involved, concerned not only constructing the A4, but also improving the quality of the landscape surrounding it. When the IODS plan was conveyed to the national government in order to formalize the decision, it became clear that this government was not about to give in to all the wishes the local authorities had agreed upon. This became a reason for these actors, who were already having difficulties conveying their agreement on building the A4 to their own constituencies, to withdraw their support.

The departure of Marnix Norder as politician for the province left his successor to mediate between the different parties, resulting in a frail regained trust. In 2007, the newly appointed Minister for Transport made the construction of the A4 Middle Delfland, which is how the road is commonly referred to, one of his top priorities. However, difficulties with previously drawn up justifications for choosing the A4 to solve accessibility problems again stalled the progress of the development.

The A4 Middle Delfland project has proven to be a typical project in the Randstad. The project has many similarities with the long-ago planned highway between Amsterdam and Almere (the A6–A9 connection, also drawn in a dotted line on many maps). This project led to the emergence of a collaborative network (called The Way Out) comparable to IODS. What is especially noticeable and recurrent in most projects in the Randstad is that actors have come to agreements on difficult, long-running projects within collaborative structures, but are also confronted with organizations that are not a part of the agreement and that focus on their own goals. In the case of the A4 Middle Delfland and A6–A9 projects, the national government acted in line with their own aims with regard to finance and development, thereby halting the negotiations once more. Local governments and NGOs, on the other hand, attempt to accommodate all the wishes of participating actors in their collaborations and sometimes lose track of the rules and restricted resources of national departments.

## 6.6 COORDINATION ATTEMPTS AT ‘WING’ LEVEL

The early years of the new century were a breeding ground for new collaborative structures. This seems to have especially increased the impact of the critical evaluation of Regio Randstad in 2005. Accordingly, the managerial climate in the country induced governmental actors to collaborate on various issues.

In the northern region of the Randstad, various municipalities including Amsterdam, Almere, the Wgr-regions and provinces joined hands in reaction to the task posed by the national government to realise some 150,000 residences in the area. Each of the organizations could have responded to this task all by itself, but an alderman of the city of Amsterdam and a member of the Provincial executive initiated a regional approach. The 'North Wing' conference that followed turned out to be the first in a series of meetings where diverse authorities met one another in a non-hierarchical setting. After having reacted to the housing issue, actors began collaborating on an approach to tackle the mobility and economic issues of the region. The North Wing conferences are mostly aimed at accomplishing a coherent and integral spatial strategy for the northern Randstad region. The governments in the regions also invited several NGOs and representatives of the business world to participate in the conferences. In addition to mutual coordination, the region also attempted to obtain commitment from the national government to support their strategy and projects.

A similar development took place in the southern part of the Randstad. Aldermen and officials of the two largest municipalities in the region, The Hague and Rotterdam, began to collaborate on shared issues, such as mobility. Politicians noticed, after quite some time, the potential of collaboration in solving long-lasting spatial project problems in the region. However, they found that support was required for the collaboration to get this desired effect. In order to gain support, the collaborating actors together with the province called on the national government to install a 'South Wing commission', whose formally attributed task would be to explore the possibilities for more formalized managerial collaboration on a South Wing level.

Several high-level bureaucrats from the ministries involved noticed the interactive tendency in these dense urban regions. In a period of political perturbation, these public managers were facing shortcomings from the traditional project approach to spatial development. In informal deliberations, they concluded that the spatial development of regions like the North and South Wing could benefit from improved collaboration between national departments and more coherence between (sectorally divided) projects. These were the main arguments for the establishment of a programmatic approach by the national government. In the case of the North Wing, this led to the nomination of the Department of Transport to provide with the program management of a spatial development program for the region. The program management became responsible for the coordination of the national departments involved and aimed at mutual adjustment between the national government and regional authorities. They allowed two regional governmental representatives to join the program team. Regional governments continued with the North Wing conferences to coordinate their agenda, but also to act upon the development of the program. Most actors involved in the preparations and the making of decisions endeavored

to create a multilayered governance setting. The Ministry of Finance, however, was more reserved. It insisted upon decision-making within the boundaries of the national government. Besides intergovernmental collaboration to prepare decision-making by administrators, the main function of the program was to manage the interrelations between projects. The program management facilitated regular deliberation among project managers. After some hesitation, project managers received this enthusiastically for as long it came down to mutual learning among project managers, without the imposition of tasks from the program.

In the South Wing, the commission that was called for was installed, and in 2001 published its final report. Confirming the need for collaboration, it advised the instalment of an administrative 'South Wing bureau' to support South Wing collaboration. Inherent in this formalization, the South Wing collaboration became a platform from which municipalities, regions and provinces could negotiate with the national governmental departments. The approach for the South Wing consisted of a political arena where local actors decided on issues and an administrative arena where the ground-work on issues was done and political decisions were prepared.

Most actors within the North and South Wing collaborative structures acknowledge the added value of collaboration in tackling difficult spatial development issues in their respective areas. In practice, however, there are several threats to its functionality.

For one, smaller municipalities often consider themselves disconnected or even ignored in the collaboration between the (larger) cities, Wgr-regions, provinces and national departments. Smaller municipalities are rarely invited as interlocutors in the collaboration and are merely indirectly represented by Wgr-regions and/or provinces. The latter also scarcely have any influence on the interplay between the larger cities and national departments.

Another issue involves the project-orientation of actors involved in the North and South Wing collaboration. In the North Wing program, for instance, fairly early in deliberations with local actors, a list was drawn up naming eight projects. It was agreed upon that this would be a static selection, where throughout the course of the program no new projects could be introduced onto the agenda. Selection was not only based on the priority of the project, but also on the interrelatedness of the set of projects. The intention was announced that these projects should have coordinated deadlines in their decision-making processes. Nevertheless, responsibilities and say in the projects remained with the line organizations. This reinforced the sentiment that the program was a 'linking pin through existing projects'. In addition, according to project organizations this 'linking pin' caused unnecessary hindrance due to imposed deadlines. Although these were introduced to stimulate a timely project course, they became problematic when the deadline drew near and money was tight. At such times, actors avert attention from the Wing collaboration, agitating against the 'impossible deadlines' set from outside the project itself. It is argued that their

projects had already been running and already had their own planning, agenda and dynamics.

The tendency of organizations to focus mainly on their own projects is reflected in the sentiment that grew in the North Wing, that the coordinating department paid a disproportionate amount of attention to infrastructural projects, which reduced the amount of attention paid to stimulating integral development and coherence among projects. In the South Wing, the projects central to discussions can also mostly be brought back to the three most influential actors in the region: The Hague, Rotterdam and the province of South Holland. The involvement of other actors in the region seems to emanate from their need to be informed of any developments that may harm their own intentions. In general, actors other than the ones pursuing their own objectives feel that they are of minor importance to regional development. In a similar vein to the difficulty of representation by Wgr-regions, this causes actors to focus inwards on their own goals and intentions.

One of the approaches that seems to have had success in dealing with the difficulties described is the introduction of a broader view on spatial development in the Wings. This was an attempt to regain the trust of actors in the region. In the South Wing, this was done by introducing work groups that were to focus on future needs within specific sectors, such as the urbanization strategy. In the North Wing, although the program management received several requests to focus on the creation of an integral view for the regions' future, prioritization and the setting of deadlines for projects remained high on the agenda. Nevertheless, in order to fulfil the requests, documents were composed describing the most important tasks, their interrelatedness, future expectations and goals of the government organizations involved. Besides deliberation with national departments, regional governments and project managers, the program management also organized consultation sessions about their documents with NGOs and representatives of the business world. Although it appeared rather difficult to bring everything together in documents, the interaction and adjustment with these actors also lent support to decision-making. Actors were motivated to follow the program's schedule and to take the other projects of the program into account. Future development of the region is framed from current bottlenecks and policies of the governmental organizations that are already involved, although regional governments are working on an integral strategy for the development of the North Wing as well. The involvement of NGOs and businesses in strategy and decision-making processes remains mostly limited to consultation about government documents.

## 6.7 CONCLUSIONS ABOUT SELF-ORGANIZING GOVERNMENTS

This chapter has dealt with the concept of self-organization. It has been applied to government actions in the complex Randstad Holland

metropolitan region. In metropolitan regions, governments have to deal with interrelated and jurisdictional boundary-exceeding issues such as housing shortages, economic viability and international competition. Four appearances of conservative and dissipative self-organization were identified: governance restructuring, strong project leadership, governance alliances and joint program approaches.

### **6.7.1 Conservative Self-organization: Restructuring and Project Leadership**

Conservative self-organization is manifested in two ways. The first is the search for new or adjusted formal government arrangements. These arrangements are suggested to replace existing multi-actor situations, decreasing the number of agents in the system and thereby recovering, at least for a part, control and guidance. They intend to re-establish strict governmental boundaries. This conservative type of self-reorganization by governments receives a tremendous amount of attention. Many governmental officials and representatives see this as an attractive option.

At the same time, it is striking to see that almost none of the proposed options to reinvent government, capable of guidance and control, were implemented. Some of the options were abandoned by citizens in referenda. Others were undermined by existing government officials who were not willing to give up power. There were also options handed over to the national government, but rejected by the new Cabinet, basically because they did not want to start a new lengthy reorganization without certainty about the outcomes. This leads to an important conclusion: even attempts to restore guidance and control cannot be carried out if they do not fit in with the ambitions of a variety of self-organizing subsystems already active in the governance system. These observations underline the importance of self-organizing capacities in governance systems, the relevance of the distinction between conservative and dissipative self-organization and the complex relationship between the two.

The second appearance of conservative self-organization can be found in the proposals and actions to improve project leadership so that it is able to push the plan through, despite all the resistance from citizens and social groups. A variety of attempts to apply a more hierarchical and power-centred legal system to support project leadership were proposed. Several of them were even applied. In all cases, the project is assumed to contribute to the interests of the whole metropolitan system, while the opposition is accused of being egoistic.

In the case of the A4 project presented earlier, the ministry had been attempting for dozens of years to execute the implementation, mainly by issuing (new) laws and pursuing regulatory procedures. This conservative practice, however, clearly had reversed results. It adversely induced local actors to focus even more strongly on their own aims, strengthening their



own (conservative) self-organizational capacities. This leads to a second intriguing conclusion, namely, that conservative approaches by one of the agents in a governance system will incite conservative approaches from others. At the beginning of the twenty-first century, a whole variety of projects in the Randstad Region was characterized by a fierce, often juridical, fight between leaders of projects and governmental and social resistance, leading to endless procedures. It seems to be extremely difficult to perform single-project leadership in complex governance systems.

### **6.7.2 Dissipative Self-organization: Programs and Joint Strategic Partnerships**

In the same A4 Highway case, there is an interesting occurrence of one of the two appearances of dissipative self-organization that have been identified, i.e. the program approach. While the Department of Transport on the one hand and local governments and societal groups on the other were clearly involved in a rather inert interaction, performing a variety of actions without much progress and sticking to their own positions for a long time, a new governmental agent appeared on the scene, a member of the Provincial executive. When he initiated new talks on a broader subject than just road-building, trust among actors was renewed and more dissipative interaction beyond existing and fixated system boundaries emerged. Actors shifted their focus outward more and allowed themselves to think more innovatively and from an integrative perspective on the issue. New dynamics appeared. This program approach evaporated, however, because the national government held on to its conservative attitude, deviating from the IODS agreement in terms of content as well as ways of acting. This leads to a third intriguing conclusion, namely, that processes of dissipative self-organization focusing on building joint interests can easily be destroyed by existing forms of conservative self-organization.

A second appearance of dissipative self-organizing capacities can be found in the ability to create alliances that are able to meet the multiple ambitions that arise in metropolitan regions. It was discovered that there are as many attempts to build up alliances in the Randstad Holland area as there are attempts to create a new government authority. In dissipative attempts like the program approach in the Wings, actors in metropolitan governance often acknowledge the necessity of crossing organizational boundaries. This is reflected, for instance, in the creation of the program approach. On the other hand, they have a tendency towards conservative behaviour, which can be observed in the focus of the Department of Transport on infrastructure projects while they were also responsible for integral program management. In this sense, the preferences for dissipative and conservative self-organization approaches seem to be balanced out in this case study. This could be a manifestation of confusion among governments about how to deal with complex systems.



In the Randstad Holland case, two instances of building alliances were highlighted. The first focused on the North Wing region. This alliance was rather positively reviewed by agents involved in the case. The unique characteristic of this alliance was that it was initiated by an alderman of the city of Amsterdam and a member of the Provincial executive. This bottom-up process was combined with a national program approach focusing on the same region. In general, both processes were integrated and worked quite well.

The second instance of alliance-building was the collaboration in the southern part of Randstad Holland. Due to difficulties of representation and a focus on specific projects, the alliance became merely a vehicle to obtain money from the national government.

Both alliances have yet to prove their success. However, both seem to be unable to create innovative and appealing agendas. Further, the alliances are facilitating existing project developments. This leads to the fourth conclusion, namely, that connecting forms of leadership in metropolitan areas are clearly elaborated upon. At the same time, however, it seems to be extremely difficult to generate 'real' dissipative behaviour in terms of content innovation and joint interest.

### **6.7.3 In Search of the Coevolution of Self-organizing Capacities**

In general, it can be concluded that conservative and dissipative self-organization is at work in complex systems. This has been confirmed in the case of the Randstad Holland area discussed in this chapter. It is clear that governments facing complexity are in search of improvements, but are in great doubt as to where improvements can be found. All four options identified, i.e. restructuring government, strengthening project leadership, developing program approaches and building alliances, occur. From our analysis, no evidence was found that any one of the four strategies to deal with complexity is superior to the others. Instead, a variety of failures and non-implementation was observed.

It is assumed that governance capacity on complex systems such as the Randstad Holland metropolitan region can only be improved if the two appearances of self-organization are capable of enabling each other's strengths. In governance reality it takes little to nothing to disturb carefully prepared proposals for restructuring, project leadership and program or strategic collaboration. We are only now beginning to gain a better understanding of the coevolution between the options applied in recent years. The added value of the concept of self-organization and the distinction therein between conservative and dissipative forms has been shown in this chapter.

In this sense, the added value of applying the self-organization perspective is clear. Where literature on metropolitan governance has mostly focused on specific actions and discussed their merits, the self-organization

perspective allows for an understanding of actions on a broader scale with attention paid to the power of dynamics, the interplay between reorganization and bottom-up forms of self-organization.

It is also clear that our understanding of the coevolution between conservative and dissipative self-organization must be considerably improved. The issue of coevolution will be explored more explicitly in Chapters 8 and 9.

## NOTES

1. Some scholars consider autopoiesis as dissipative (e.g. Jantsch, 1981) and others as conservative (e.g. Kickert, 1993; Dempster, 1998) self-organization. In this chapter autopoiesis is considered as conservative self-organization. See Chapters 1 and 2 for an elaboration on the relationship between autopoiesis and self-organization. Chapter 7 continues this debate.
2. New towns in the Netherlands imply in most cases a considerable expansion of existing villages, except for new cities in the reclaimed Flevopolder (e.g. Almere and Lelystad).
3. Named after its chairman Wim Kok, former Prime Minister of the Netherlands.

# 7 The Complexity of Self-Organization

## Boundary Judgments in Traffic Management

*Bonno Pel*

### 7.1 INTRODUCTION

The previous chapter showed that self-organization is a basic mechanism that explains that non-linear developments are the normal state of public management systems. It is striking how governing agents attempt to bring order, but often contribute to disorder experienced by others. Complex patterns of interference between conservative and dissipative self-organization tend to emerge. Multiple self-organization leads to complexity not only out of sheer numbers: its observations and interpretations matter greatly. Self-organization can be experienced or *perceived* as steering. Second order cybernetics emphasizes that this depends on the vantage point assumed. “But even in the general case when the systems dynamics allows self-organization in the sense of entropy decrease, the crucial factor is the observer, who has to describe the process at an appropriate level(s) and aspects, and to define the purpose of the system” (Gershenson and Heylighen, 2003: 612).

This chapter will address the observation aspect of self-organization complexity. This will be done by examining a claim often heard in the traffic management sector, i.e. the claim of ‘self-organizing traffic order’ (Van Koningsbruggen and Immers, 2002). Traffic management, which is the guidance of cars, buses, cyclists and pedestrians through the infrastructure system, is essentially an ordering practice. It is meant to prevent accidents and ensure traffic flow efficiency. Ordering takes place by means of road marking, traffic signs, traffic lights, information panels and traffic controllers. This meticulous delineation of mobility behaviour could be a textbook example of top-down coordination.

On the other hand, traffic order cannot rely solely on centralized control. Firstly, traffic management relies on a whole array of technologies. Current high-tech forms of traffic management are typical of governance in a technological society. This ‘steering at a distance’ can be considered to be a manifestation of a general tendency towards self-organization by technological means (Rose and Miller, 1992; Barry, 2001). These technologies have been designed and they are controlled, but still can be assigned a distinct role in traffic order. They are the non-human ‘actants’, as known

in actor-network theory, in traffic management. Traffic order can therefore be considered a socio-technical hybrid (Wetmore, 2004). Secondly, it should be noted that all of these ordering measures presuppose a capacity of traffic participants to act upon the guidance they receive. General rules and prohibitions are inevitably incomplete. The caution and improvisation of traffic participants, their capacity to self-organize, to keep their distance and produce the human version of swarms of birds is crucial. In these two senses, traffic order is a hybrid system (Weyer, 2004). It has human as well as non-human and steering as well as self-organizing elements.

Characterizing traffic order as a 'hybrid' system provides a very general definition, of course. Assessment of the relevance of the distinct components and specification of the claim of self-organizing traffic order are not straightforward matters. Not only has traffic management changed over the years, but there are also differing observations of these changes. Through so-called 'boundary judgments', actors draw boundaries between what they consider to be relevant and what they do not (Flood, 1999b: 92; Ulrich, 1983; see Chapter 3 in this volume). These 'boundary judgments' of actors will be shown to strongly affect the assessments of both past and current traffic order.

In the first section, two accounts of traffic management evolution will be presented. The first suggests a history of systemic adaptations to contextual pressures. Current high-tech 'dynamic' traffic management is considered to be its culmination point, characterized by self-organizing technologies. The second account reframes the alleged history of adaptive traffic management as one of self-reproduction. On this account, adaptation has been modest. Social self-organization is even said to be suppressed by a 'conservative' traffic management sector. In the second section, a concrete case of town centre reconstruction will bring these constructions to life. The 'Shared Space' approach to road design aroused controversy. Social self-organization was experimented with as a potential alternative to traffic management order. It will become apparent that the case at hand was defined through differing 'boundary judgments'. In the third section, these 'boundary judgments' will be reconstructed. The competing interpretations of traffic management evolution will prove to be relevant here. In the final section, a public management strategy is recommended that aims to stimulate reflection on these 'boundary judgments', on what the system to be governed actually is.

## 7.2 ASSESSMENTS OF TRAFFIC MANAGEMENT EVOLUTION

Two accounts of traffic management will be briefly discussed in this section. The first perceives a development from 'policing' to 'self-organization', while the second views it as 'conservative system reproduction'. In what sense do they consider traffic management to be self-organizing?

### 7.2.1 Traffic Management ‘From Policing to Self-organization’

With the advent of the car, many feared chaos arising from the introduction of fast-moving vehicles to the streets. To counter societal disruption, cars were subjected to a very strict speed limit, and had to be escorted in the front by a man carrying a flag to warn innocent passers-by. This is traffic management as ‘policing’. However, the number of cars grew rapidly. Even before the Second World War, Mannheim diagnosed this growth as a development typical of modern mass society to fall victim to ‘maladjustments’. Technological development, and the concomitant growing impacts of human action, was said not to be met with a proportional development of responsibility. ‘Reconstruction’ was deemed necessary, a holistic planning approach, insurrecting a Leviathan to prevent societal disintegration (Mannheim, 1940).

Mannheim would have been satisfied with the development of traffic management during post-war reconstruction in the Netherlands. Traffic management was a controller’s paradise for a long time (Geels, 2007). Experts enjoyed knowledge that was hardly contested. In the 1970s, there was a growing gap between their technical considerations and policy objectives (Westerman, 2005). Still, traffic management seems to have been extremely successful in optimising both traffic safety and traffic flow, managing increasing volumes of traffic on a relatively small infrastructure capacity. From the 1960s onwards, instruments such as traffic lights were equipped with more and more sophisticated programs to optimise traffic flow beyond local optima. A good example of traffic light optimisation is the in-built prioritization of specific travel modes, or the differentiation in green cycles serving peak or off-peak situations. Optimisation inevitably reached its limits, though, as the traffic intensity continued to rise. Advanced forms of traffic management were then required.

A range of new measures came within reach from the ICT revolution. These included Dynamic Route Information Panels, dynamic lane partitioning, ramp metering and advanced information services, to name a few. Typically, these instruments responded to actual traffic circumstances, unlike static measures such as traffic signs and partitioning. This ‘dynamic’ traffic management (DTM) had been experimented with since the 1960s, but its development was speeded up drastically by ICT (Westerman, 2005). Processing, storage and transmission of the information became much easier after this. The era of traffic control through personnel-intensive ‘policing’ had now been left behind.

It can be argued that DTM is the system’s adaptation to ever more demanding circumstances. This radically heightened responsiveness to actual traffic conditions suggests that it relies on self-organization. This would substantiate the idea of a fundamental break with the ‘policing’ stage. Is dynamic traffic management self-organizing, defined as *the appearance of structure or pattern without an external agent imposing it* (Heylighen, 2001: 2)? If yes, it must meet the following criteria:

1) produce a sufficient variety of actions to cope with each of the possible perturbations (Ashby's 'law of requisite variety'); 2) select the adequate counteraction for a given perturbation. Mechanical control systems, such as a thermostat or an automatic pilot, have both variety and selectivity built in by the system designer. Self-organizing systems need to autonomously evolve these capabilities. (Heylighen, 2001: 15)

Traffic lights, which are common instruments of traffic management, can act as a test example. Are they merely stand-ins for a system designer who has preprogrammed them completely, or are they able to generate solutions on their own?

Gershenson (2005) exposes how traffic lights can self-organize. Traditionally, traffic lights are synchronized into fixed cycles, alternating between a red and a green light. Such static arrangements are tailored to average conditions. At high traffic intensities, however, speeds drop and cars can no longer keep up with the 'green waves', which are the cycles meant to optimise traffic flow (Gershenson, 2005: 31). Adaptation to traffic intensity is required for improvement beyond this point. Gershenson's example is quite simple: traffic lights keep a count of cars approaching a red light, and as soon as a certain threshold is reached, they switch to green. Groups of cars, or 'platoons', have priority, and the spaces between platoons allow for the crossing of other platoons with minimal interference.

The phenomenon of full synchronization shows us how self-organizing traffic lights form platoons, which in turn modulate traffic lights. This feedback is such that it maximizes average speeds and minimizes waiting times and stopped cars in a robust way. The self-organizing traffic lights are efficient without knowing beforehand the locations or densities of cars. (Gershenson, 2005: 32)

Cars and traffic lights are used as conditioning environments for each other. A group of these traffic lights self-organizes, heightening the performance of several adjacent crossings. This emergent supra-local order is robust against individual dysfunction, as is typical for self-organizing systems: "the global performance degrades gracefully as more traffic lights become faulty" (Gershenson, 2005: 34).

The fundamental difference with 'policing' is clear. An emergent, rather than designed and imposed, order has been established. The DTM stage can be considered to be the culmination of a process of adaptation to traffic conditions, as the emergence of responsive traffic control suggests. Still, the self-organizing traffic lights operate on the basis of the designer's selection of relevant parameters and preferred settings; for instance, through the prioritization of certain transport modes. The crucial boundary judgment to consider traffic lights as 'self-organizing' lies in the emphasis on their interaction with traffic. The role of the system designer is de-emphasized.

In the next section, a critical account of traffic management evolution will provide a critical evaluation that adaptation has been limited, and that the ‘policing’ stage has hardly been left behind.

## 7.2.2 Traffic Management as ‘Conservative Self-reproduction’

DTM can be said to be the self-organizing stage of traffic management. Still, DTM may be ‘dynamic’ only to a limited degree. Its alleged self-organization and the historical interpretation of adaptive evolution will be challenged in the following account.

Traffic lights may have become self-organizing, but their responsiveness to traffic should not be overstated. Their vocabulary still tends to be limited to two colors, for instance. Also, the existing Dutch traffic light population still often suffers from poor maintenance, leaving them terribly maladapted to actual conditions. This moderates the claims to self-organization. Some interpretations of evolution even suggest that traffic lights actually prevent a self-organizing traffic order from developing.

Although widely accepted, traffic controls are an unnecessary evil, imposed on a road network by governments with no commercial incentive to ensure the free flow of traffic. Far from making our roads safer and less congested, traffic lights make matters worse. They take our eyes off the road, obstruct our progress and cause needless delay. In the process they damage our health, the economy and the environment. There is another way: remove controls and restore the common law principle of first-come, first-served—or ‘filter-in-turn’, as it’s known in the Channel Islands. The optimum form of traffic control is self-control. The onus should be on government to prove otherwise. (Cassini, 2006: 75)

The basic idea is that people can coordinate through eye contact. Self-control is suggested as the primary means of creating traffic order. “Who is the better judge of when it’s safe to go—you and me at the time and the place, or remote lights programmed by an absent regulator?” (Cassini, 2006: 76). Traffic controls are considered to interfere with social self-organization; i.e. they *cancel* it. This drawback has been pointed out by a range of advocates for social self-organization in traffic management (Baluw, 2007; Shared Space, 2006; Cassini, 2006). Still, traffic lights continue to be put forward as common solutions to traffic problems. Even when they are made more responsive, their modus operandi seems to stay fixed. Several authors have argued that traffic complexity tends to be responded to by technological fixes (Hajer, 1995; Topp, 1995). As noted in Section 7.1, its development has been strongly technology-based, rather than policy-based, let alone society-driven.

The allegation of a technological fix amounts to a radically different assessment of the evolution of traffic management. Emphasis on the

ordering potential of social self-organization is the crucial boundary judgment here. The asserted evolution of adaptation is reframed as a history of systematic self-reproduction. It is not so much responsiveness and adaptation, but internal coherence that is its supposed strategy to cope with a turbulent environment. Indeed, the Dutch road system has a high level of uniformity, as is evident from its manifestations along the road. The traffic management sector has managed to establish a road system *as a system* (Geels, 2007). ‘Conservative self-reproduction’ may be explained by its success in terms of safety and traffic flow; i.e. by the reasons not to ‘change the winning team’.

Assessment of traffic management evolution has proven to be a controversial matter. Especially striking are the two forms of self-organization mentioned in these accounts—the traffic light self-organization and social self-organization. On radical accounts such as that of Cassini’s, these two forms tend to cancel out. The first emphasizes the role of artifacts, the second the role of traffic participants. These boundary judgments accord different degrees of relevance to traffic order components: ‘Self-organizing traffic order’ presupposes an observer. In the following case, the differing observations are actually confronted.

### 7.3 SOCIAL SELF-ORGANIZATION IN PRACTICE: THE HAREN TOWN CENTRE RECONSTRUCTION

In Section 7.2.2, social self-organization was suggested as a means of achieving traffic order. Its practical merit has yet to be established, however. Of course, traffic lights are sometimes switched to the ‘orange’ state during off-peak periods, and not all traffic situations are governed by traffic lights. Also, traffic behaviour under the condition of traffic light dysfunction has been registered on video (Baluw, 2007), offering interesting real-life demonstrations of social self-organization. However, deliberate and permanent application of social self-organization is exceptional in cases of high traffic intensities. The Shared Space network has developed a new approach to road design, seeking to do just that. One of its prime cases will be described in the following.

#### 7.3.1 Shared Space

Haren is a village of almost 20,000 inhabitants, a few kilometres south of Groningen, the main city in the northern Netherlands. It can be considered to be a Groningen suburb. The two are connected by a historical provincial road, the Rijksstraatweg. In the year 2000, plans were being prepared for the reconstruction of the town centre as a prominent part of a village-wide reconstruction program. The town centre and the public space in its shopping area had been somewhat worn out, and the Rijksstraatweg was



due for maintenance. This main road cuts through the town centre. Alongside it are the main shops, the church, town hall and the main square. The local government sought to combine the road reconstruction task with the public space ambitions as the two seemed to be intrinsically connected: the Rijksweg, a two-way road used by several regional bus lines, with separate bicycle lanes on the sides, put its strong stamp on this area. A typical problem was considered to be its barrier effect; i.e. the difficulty it posed for the shopping public to cross the street. The local government stated that the dwelling function was to be reinforced. It placed an announcement in the local newspaper asking the public for suggestions.

Based on the responses received from the public an advisory council was established, in order to generate an inventory of problems and challenges, so as to inform the municipality council. The following main problems were identified:

1. difficulties crossing the road
2. high speed of traffic
3. dimensioning of the pavement
4. 'ugliness' of the town centre

According to local government officials, the civil participants suggested a radical redesign of the Rijksweg: instead of a motorized traffic-only main artery flanked by bicycle lanes, an undivided road surface was to be created. This design would solve the barrier problem, transforming a partitioned transport space into a square-like dwelling space. It would be paved in accordance with the envisaged new function, with stones instead of asphalt. The most striking element of the proposed solution strategy, however, was the idea of mixing traffic. Pedestrians, car drivers, cyclists, motorcyclists and bus drivers were to share the same space.

The advisory council's proceedings were regularly reported on by a correspondent of the local newspaper. The council was expected to work with transparency to the public. When the daring plans were presented to the municipality council, however, it turned out that the wider public, i.e. those not involved in the advisory council, seemed not to have gone along with the development of the ideas. The plans were received with apparent surprise and disbelief, and civic action was undertaken to have the plans of mixing traffic withdrawn. The opposition came mainly from the cyclists' association and several associations representing the elderly and parents of young children. Many feared chaos on the roads: a petition gathered 3,000 supporters, a considerably large number in a village of around 18,000 inhabitants. There was wide mistrust of the reliance on social self-organization. Public hearings were organized to convince the public of the initiative's merits. One day, public officials, who had sought to be only distantly involved in the advisory group's proceedings, were suddenly forced to face the public's mistrust. The independent process

mediator had gotten stuck on the way, and public officials were forced to present the advisory group's plans to the public. One basic challenge for them was to explain how the mixing of traffic, which was the main bone of contention, could ever guarantee the safety of the many elderly people and children frequenting the road.

Instead of traffic management ordering, i.e. the partitioning of road space, social self-organization was relied upon: eye-contact and 'social behaviour', i.e. taking each other into account. Even when the chaos aimed for might make for a more attractive public space, traffic safety was perceived to be neglected. In fact, this approach sought to make use of the very chaos it was reproached for. Chaos creates uncertainty, and uncertainty makes people more cautious and alert (see Adams, 1995; Sennett, 1996). In the end, this alertness is meant to serve safety. This somewhat counter-intuitive approach was not easy to get through to the public, according to public officials.

Their task was somewhat alleviated by a new actor on the scene, however: Hans Monderman, who has achieved world fame as a protagonist for social self-organization. Monderman has been experimenting with social self-organization since the 1970s, in the adjacent province of Friesland, and had become interested in the Haren plans. His extensive experience in similar approaches to road design, his relentless enthusiasm for self-organization and his talents as a speaker gave a new push to the process. Apart from witty explanations, he actually demonstrated the possibility of safety-by-chaos. His act of entering the road without looking, trusting in the self-control of his fellow 'street inhabitants', was a memorable demonstration for many individuals involved. The Haren municipality organized bus trips to Friesland for the sceptical to see and experience. In fact, it was Monderman who turned the Haren reconstruction into a showcase for the approach that later became internationally known as 'Shared Space' (Shared Space, 2007). YouTube ('Shared Space Haren') offers a short video fragment of the old and the new situation, with comments from Monderman.

Despite the intervention of this charismatic visionary, the Haren plans did not conquer the hearts and minds of all. The next subsection will show how the 'Shared Space' argument was received by the stakeholders.

### **7.3.2 Assessments of Shared Space Haren**

The local government had aimed for interactive decision-making and an 'open' process design. According to municipality officials, the plans presented did indeed originate in the advisory council. Still, many stakeholders seemed to have the impression that a risky plan was being forced upon the community by stubborn municipality officials. The processes of deliberation did not convince everybody. (According to several key actors, it was an infelicity to have had the advisory council's plans presented by municipality officials.)

Considering the amount of scepticism voiced in the petition, the Haren government had to compromise. One concession was zebra crossings, despite Shared Space tenets against such regulation. The major compromise, however, consisted of reconsidering the idea of an undivided road surface. Instead, it was decided that the pavement would be designed as a zone for both pedestrians and cyclists, for which the neologism ‘voetspad’ was introduced—a contraction of ‘feet’ and ‘bicycle’ lane. This ‘voetspad’ provided the designated area for cyclists the opposition had argued for. After one year, this arrangement would be evaluated. The alderman responsible for traffic affairs commented on this compromise in the following way:

The idea was, that the ‘voetspad’, the mixture of bicyclists and pedestrians, would be an unmandatory bicycle lane . . . bicyclists could use the runway, but could also make use of the protected zone, so to say . . . And in practice, it turned out, that the assessment we made then, that the children and the elderly, they would ‘jump’ to the pavement, and the people with more firm positions in traffic, they would continue to use the runway . . . well, this assessment proved to be wrong. Everybody, all bicyclists, used the ‘voetspad’, and then the bicyclists’ intensity in that area rose too high, with regard to the pedestrians . . . Because we had the idea, that the school children who tend to cross the town centre in the morning in massive numbers, that they would just . . . race, to put it that way, straight through town . . . But they didn’t, they went, very dutifully, to the ‘voetspad’ zones . . . as that was on the traffic sign: ‘non-mandatory bicycle lane’. They dutifully went to the ‘voetspad’, and that is why it didn’t work out.

It is interesting that the expectation was that cyclists would distribute themselves across the two distinct zones. The cyclists’ position was crucial in the discussion: there were frictions with motorized traffic on the runway. Alternatively, they might seek refuge along the rims of the street, where they would interfere with pedestrians. Hardly surprisingly, the cyclists’ association considered their interests to be in jeopardy. Even when they considered Shared Space successful in upgrading the town centre, they thought it unnecessary to sacrifice the separate bicycle lanes. Interference problems had been underestimated: firstly, their representative considered a basic mistake to be the identification of the Haren centre as a dwelling place. He considered the traffic intensity of 9,000 vehicles per day to be way too high for this; Shared Space could only be feasible if the intensity was under 5,500. The Haren centre road segment ‘could never be’ a dwelling place, as it would only be an enclave in this traffic artery. He considered this to be plainly inconsistent. Secondly, the frictions with motorized traffic are not easily settled by means of eye contact. He claimed that practice simply defies this Shared Space belief:

See, if everybody would behave, and there wouldn't be criminals and no crime, and no disturbance, well, yes, we all know that practice is differently . . . and then I think 'Sustainable Safety' and especially Shared Space, like, it is being said that, 'the people in contact with each other', 'one has to make eye contact with car drivers', and 'the car is here to visit', all of this goes way too far for me. Because making eye contact with a car driver, that is not always that easy, because sometimes there are reflecting windshields, and sometimes you just don't have the time to have a proper look at a car driver . . . (. . .) . . . As a bicyclist, I tend to see only cars, not the people inside it. Then one reacts quicker. When seeing a car, an object, that is what one reacts to.

The cyclists' representative seemed not to believe in Shared Space's reliance on social self-organization, especially given the high intensity of cars and the intensity of 10 buses per hour. He did understand the point that the bicycles on the runway tend to reduce the speed of motorized traffic, which was Shared Space's clever solution to create order by self-organization. However, he felt that this line of reasoning amounted to a third mistake:

'Bicycle traffic is supposed to calm car traffic', they really have this black on white . . . And I think that is a wrong starting point (. . .) I think it is a bad thought . . . (. . .) . . . I think it is not a right way of thinking, I mean, a bicyclist is not meant to calm car traffic, a bicycle is a means of transport, a means to get from A to B, and it is not a means of which to say, 'we put the means to use, to calm car traffic' . . . In that case, you are doing your things wrongly. If you want car traffic to lower its speed, you have to find another solution.

Clearly, the assessments of the risks of Shared Space differed greatly among stakeholders. The evaluation report was released after the one-year compromise period. Most of the safety measurements were traditional quantitative measurements of different sorts, and a survey among citizens offered qualitative data. However thoroughly conducted, the evaluation reflected the ambiguity in the assessment of safety. "The bicyclists and the pedestrians sometimes are in each other's ways, but this does not lead to unsafe situations" (Grontmij, 2004: 39). The two verdicts on 'being in each others way' and on 'safety' reveal the different criteria used to judge the feasibility of the arrangement. Different actors came up with even more criteria, relating to the occurrence of 'irritations' and 'conflicts' and to the 'convenience' and 'ease' of seeking refuge on the pavement in case of sudden crowdedness on the runway. By the time the evaluation report was released, opposition to the Shared Space propositions had waned, however. (Whether the opposition had changed their minds or whether they considered further resistance futile is not entirely clear.) The municipality council decided almost

unanimously to revert to the original plan of a unitary, shared road surface, and eliminated the 'voetspad' compromise.

Even one of the main critics, the representative from the cyclists' association, remarked that most people had adapted to the new arrangement. Similarly, the police, who were not too keen on the deregulatory, chaos-embracing strategy of Shared Space, seemed to have acquiesced to the new arrangement. However, the story did not end with the formal decision-making procedures. After the decision was made by the municipality council and its implementation, Hans Monderman and the other members of the growing Shared Space network came into contact with the Dutch organization for the visually impaired. The latter had been alarmed by their fellows abroad, where similar experiments had been conducted.

An employee of VISIO, a revalidation and advisory centre for the visually impaired in Haren, recalls that at first, Shared Space seemed not to have reflected much on the consequences for the visually impaired. Obviously, the reliance on eye contact does not work for them. He also named other problems:

1. The square-like road design seems to complicate the task of orientation.
2. The removal of kerbs eliminates them as guidelines for the guide canes.

The red stones, as well as the unitary design with only a strip of asphalt, do not offer the clarity contrasts the guide dogs need to rely on. Despite these serious objections, he did not want to criticize 'without thinking first'. He emphasized that Shared Space is not only a kind of design, it is also a form of participatory decision-making. In this sense, the approach does offer opportunities for the visually impaired.

You shouldn't shout before it's your turn. You shouldn't shout that the lack of a traffic light is unsafe, if you do not know . . . you should have a plain look at such a situation, and map it, and let us search for a better solution . . . and not retreat in the trenches.

This remark will be elaborated upon in the next section. The case will be analyzed, highlighting the circumstance that differing actors seem to have had differing 'plain looks at the situation'.

#### **7.4 CASE ANALYSIS: HAREN TRAFFIC ORDER AND ITS BOUNDARY JUDGMENTS**

Assessing system behaviour in a 'shared space' is difficult. On the one hand, mutual adjustment in traffic is an everyday occurrence. Regulation does not rule out ambiguity, but stable informal rules can be seen to emerge out of this ambiguity (Jonasson, 1999). On the other hand, this social

interaction perspective may be somewhat optimistic. In this high-tech era, spontaneous cooperation in the public sphere may be too much to ask for. Van Oenen (2004) considers the idea that such interactive citizenship may have become outdated: he pinpoints signals of widespread ‘interpassivity’ of citizens absolving themselves from responsibilities by ‘delegating’ them to technology. These two theoretical perspectives on system behaviour in a ‘shared space’ put essentially differing emphases on the analysis of ‘hybrid traffic order’.

Section 7.4.1 attempts to reconstruct the systems the Haren actors seemed to have in mind. Their boundary judgments seemed to be closely connected to their particular interpretations of traffic management evolution (Section 7.4.2).

### 7.4.1 Boundary Judgments and Complexity Reductions

The differences between actors’ assessments can be explained by assuming that some of them simply misunderstood Shared Space, and had not thought things through sufficiently. Their detailed accounts suggest otherwise, however. All of them did reveal an acknowledgement of the complexity at hand, for instance.

One alternative explanation is based on the work of Luhmann. He emphasizes that actors in modern societies tend to experience a great deal of complexity. Any situation seems to be governed by a multitude of distinct institutions, and any aspect seems to be connected to a variety of other events and actors. He postulates that this complexity enforces selective perception: the number of relationships becomes so large that a certain amount of selection must be made (Luhmann, 1990: 81). There becomes a practical need to reduce complexity by selecting relevant relationships. In this way, actors can be said to have differing systems in mind, demarcated by differing boundary judgments. Luhmann has also pointed out that if complexity is to be coped with effectively, these boundaries need a certain degree of stability. Stable distinctions between the internal system of meaning and the external environment promote survival under complex conditions (Luhmann, 1990; Morçül, 2003). These stable system/environment distinctions imply self-reference; the environment exists only with reference to the internal frame. Other cases in this book, such as the ones described in Chapters 8 and 9, show that such processes continuously occur.

The insistence on actors ‘decomposing’ a situation in their own particular ways entails a relativist epistemology (Cilliers, 2005; Luhmann, 1990; see also Chapter 3 in this volume). Thus, even when actors seemed to entertain their particular ‘decompositions’ of the Haren town centre, the reconstruction of their boundary judgments relies heavily on the particular observations of those, i.e. on the *analysts’* observation of observations. With this caveat in mind, reconstructions will be exposed in the same order as in Section 7.3.2.

The alderman embraced the Shared Space view, trusting in social self-organization. He viewed the chaotic traffic situation as a success rather than a result of a faulty design. To him, the town centre was *both* a dwelling space and a traffic space. This idea went against the traffic management road categorisation doctrine that would classify the Rijksweg as a traffic artery. This distinction is crucial, as it seems to determine further boundary judgments: the alderman considered the 'dwelling/traffic' system to contain traffic participants that would generally be able and willing to self-organize. He admitted his incorrect assessment of the dutiful attitude of those involved. In his analysis, the system operation depended not only on the traffic participants' dispositions, however, but mainly on the specific mix of traffic modes: he considered the cyclist to pedestrian ratio on the 'voetspad', and correspondingly, the car to cyclist ratio on the runway, to be too high. Through these boundary judgments on dispositions and abilities of people, and through his emphasis on the relevance of the particular traffic mix, he explained 'voetspad' failure.

The representative of the cyclist's association seemed to have a larger system in mind. He considered the 'dwelling place enclave' to be a systematic inconsistency, observing it as part of the larger 'Rijksweg system'. Given the intensities, he considered it traffic space, referring to the aforementioned road categorisation guidelines. Furthermore, he was sceptical about the disposition to cooperate, referring to the 'practical fact' that there 'simply *are* criminals'. To this point he added that eye contact coordination between car and cyclist is not the system behaviour one should expect to occur. The cyclist has to act quickly and has no time for social self-organization. Finally, he rejected the idea of having cyclists calm motorized traffic, considering it to be 'inconvenient'. He also considered the use of cyclists as a means to an end to be an inappropriate line of reasoning (Senge [1990] would call it 'systems thinking'). His negative assessment of Shared Space seems to be mainly based on 'boundary judgments' concerning the dispositions and abilities of people. Both moderate the belief in social self-organization. In general, he seems to observe the traffic situation self-referentially: as a cyclist he sees *cars*, not drivers.

The VISIO representative seemed to observe the situation through the referential system of the visually impaired. Not being impaired himself, he could distance himself from this particular complexity reduction. He did seem to agree with the designation of this space as a dwelling/transport space. However, he considered the aesthetic value of public space to be secondary to functional considerations. He largely shared the Shared Space assumptions on the dispositions of traffic participants, but his analysis differed in the analysis of abilities, where he pointed out the specific risks conferred on his clientele. To him, it is not just safety that matters, but orientation as well. He assessed the spatial design by its sensory qualities, be it by immediate eyesight, by means of a sensory cane or through the eyes of

guide dogs that have their own specific self-referential perception. Finally, he typifies Shared Space not only as a spatial system, but also as a participative governance system. He seems to endorse this approach, recommending stakeholders to think first and not simply retreat to the trenches.

#### **7.4.2 Boundary Judgments and their Histories**

The account of the Haren alderman has a distinct historical dimension to it. The Shared Space approach is, in fact, an attempt to mitigate the perceived historical pattern of a ‘conservative’ traffic management sector ‘reproducing’ itself (Section 7.2.2). The following quote from a Shared Space publication expresses the point more explicitly:

With the advent of the car, the traffic sector was born and correspondingly the profession of traffic expert. The rising number of fatal road accidents required political action. The number of traffic experts grew, and they developed their own tools and plans to combat unsafe traffic situations. That was the objective of their profession. The way in which public spaces were designed was determined more and more by the traffic sector and by isolated objectives and less so by politicians and the public interest they serve. Instead of being subsidiary to man and society, the sector started to determine and control the lives of individuals and groups. The situation has grown out of sync and politicians must turn the tide. (Shared Space, 2006: 28)

The spokesman of the cyclist’s association qualified the separate bicycle lanes as a historical acquirement. His organization has had a long history of pleading for separate bicycle lines in order to protect the cyclist from motorized traffic. It was precisely this particular form of traffic management ordering that he sought to save in the Haren plans. His reference to the road categorisation doctrine suggests a belief in ‘adaptive’ traffic management evolution (Section 7.2.1). On the other hand, he complained about traffic management’s persistent neglect of the interests of cyclists.

Finally, the historical dimension of the VISIO representative’s account is less clear. He seemed to see ‘conservative self-reproduction’ in traffic management. He warned against a self-referential retreat to the trenches and a reliance on the standard repertoire of traffic lights and signs. He also had his doubts about the consequences of social self-organization for the visually impaired. In the future, their safety might still be safeguarded best by technological means, i.e. by highly accurate GPS. Such a solution could be considered to be a future evolutionary stage beyond the current DTM. He seemed to accord importance to both technological and social self-organization.

This case analysis is briefly summarized in Table 7.1.



*Table 7.1* Boundary Judgments in Haren: Actors, System Definitions and Interpretations of Traffic Management Evolution

<i>Actor</i>	<i>System reconstruction</i>	<i>Reconstruction of evolution interpretation</i>
Shared Space	<ul style="list-style-type: none"> <li>• dwelling/transport space</li> <li>• reliable eye contact/communication</li> <li>• social self-organization</li> </ul>	conservative self-reproduction
Bicyclists association	<ul style="list-style-type: none"> <li>• transport space</li> <li>• limited car–bicycle eye contact; interference</li> <li>• partitioning of space (separate bicycle lanes)</li> </ul>	bicycle emancipation
VISIO	<ul style="list-style-type: none"> <li>• dwelling/transport space</li> <li>• limited eye contact</li> <li>• social self-organization, with possible technological solutions</li> </ul>	socio-technical coevolution

## 7.5 MANAGEMENT: SHIFTING BOUNDARY JUDGMENTS

Metaphorically speaking, the Haren town centre reconstruction process can be considered to be an intersection where different views meet, an amalgamation of different views. Differing boundary judgments were made on a situation considered by all to be complex. Differing assessments were made of traffic behaviour, and it even transpired that not all agreed on a basic categorisation of the situation; traffic space, dwelling space or both. This poses governance challenges that will be addressed in the following.

### 7.5.1 Re-entries

Actors reduce complexity by drawing distinctions between their system and its environment. Each actor enacts his own system. Some distinguish their system quite clearly from its environment and become self-referential. This may lead to unawareness of the parallel but different selectivity of other actors. Deliberation is difficult under such circumstances, as stakeholders are bound to misunderstand one another (see Chapter 2 of this volume).

If agreement is to be brought about, and especially if self-referential ‘trenches’ are to be left, these all too stable system/environment distinctions need to be reflected upon. Reductive system/environment distinctions leave out certain relationships, and then they are forgotten. In Luhmann’s terms, these externalizing distinctions must be *reintroduced* (Luhmann, 1995, 2000; Thyssen, 2003). Re-entry is a reminder of forgotten, only implicitly present, distinctions. In fact, this is what Shared Space seemed

to be all about: Shared Space reacts to an allegedly self-referential traffic management sector. The particular complexity reductions of the ‘conservatively self-reproducing’ sector are considered to have come to dominate public space. What these reductions are taken to externalize from its system, and neglect, are social self-organization and the function of public space as a dwelling space. Shared Space aims for the ‘re-entry’ of these functions through what has become a series of projects in various north-western European countries (Shared Space 2007). It reasserts social self-organization as a vital part of traffic order, and seeks to re-enter the road categorisation doctrine.

Of course, the Haren case was not just about the self-reproducing traffic sector. It featured several actors with their particular boundary judgments, and also featured several attempts at re-entry. A few examples of this can be seen in Table 7.2. There are two things to note from this table: first, several re-entry attempts may coincide. Shared Space sought to convince stakeholders to reconsider their views on traffic safety, and several stakeholders sought to make Shared Space representatives reconsider their risky system definition. Second, the reflection on system boundaries does not have a determinate outcome; that is up to the system undergoing re-entry.

### 7.5.2 Autopoiesis and Change

The strategy of re-entry is very similar to reframing (Schön and Rein, 1994). One important particularity, however, is that it emanates from a radically constructivist (Schaap and Van Twist, 2001; In ‘t Veld et al., 1991) social analysis. It entails a relativist attitude to truth claims (Section 7.4.1.), which is different from, for instance, a critical heuristics (Ulrich, 1983) approach. Luhmann placed relatively strong emphasis on the practical necessity of self-referential boundary judgments. He provides an evolutionary explanation for this: that this self-reference is required for survival under complex conditions. Self-reference offers continuity, and he maintains that this continuity allows for *autopoiesis* (Luhmann, 1995). This autopoiesis is

Table 7.2 Boundary Judgments in Haren and Attempts at System/Environment Re-entry

<i>Actor</i>	<i>System</i>	<i>Re-entry attempt</i>
Shared Space	social self-organization through eye contact	visually impaired: ‘we are excluded’
Cyclists association	traffic space ≠ dwelling space	Shared Space: ‘the distinction is unnecessary; just experience it, and reconsider’
Visually impaired	traffic management safeguards required	Shared Space: ‘pseudo-safety—it only <i>feels</i> safer’

a method of self-reference-based self-organization. It is self-organization reproducing itself through its self-reference (as compared to conservative self-organization as discussed in Chapter 6).

Re-entry is difficult as autopoietic closure (see Chapter 2) resists it. As soon as re-entry is accepted, its complexity reducing advantage has to be foregone, and self-production might be threatened. This reframing strategy can therefore be considered to be paradoxical, as it goes against the very reductive constitution of an organization. The success of re-entry attempts in the present is strongly determined by the way in which self-referential systems interpret their historical formation (Luhmann, 2000: 342–346). The cyclists' association's history of emancipation illustrates this well (Section 7.4.2.). In this way, re-entry against the background of historical formation tends to generate a transformation paradox: i.e. the organization undergoing or experiencing a re-entry finds itself in a 'doubled' state. It involves "inhabiting a no man's land between orders" (Teisman and Edelenbos, 2004). How can one strictly distinguish between dwelling space and traffic space, and withdraw the distinction at the same time? How can one be used to traffic lights and accept Shared Space's planned disorder at the same time? It is difficult to translate such management strategy into concrete guidelines for public managers. Luhmann refrains from this, possibly as a consequence of his structuralist approach. He tends to downplay the importance of micro-level processes (Thyssen, 2003).

Re-entry requires a paradoxical kind of management. The Haren town centre reconstruction process featured a good example: the bus trips to early Shared Space locations. Sceptics were not only invited to see the plans and understand their rationale, but they could actually *experience* the paradox of 'safety by chaos'. Visionary Hans Monderman knew that this could be more convincing than reason: traffic safety is not only about risk assessment but also about feelings of anxiety.

## 7.6 CONCLUSION

Observation is crucial to developing an understanding of self-organization complexity. This applies to both the actors' observations as well as the analyst's second order observation (Section 7.4.1.) The investigations of the claims of self-organizing traffic order have shown the importance of actor observations in two ways. First, the accounts of traffic management evolution demonstrated that differing elements of 'hybrid' traffic order can be observed to be self-organizing. Interestingly, the self-organizing traffic lights (Section 7.2.1) were considered by traffic participants to hamper, or even cancel out, self-organization (Section 7.2.2). Second, the Haren town reconstruction case showed more concretely how boundary judgments affect the assessments of road design (Section 7.4.1.). These boundary judgments seem to be shaped by interpretations of history, as

especially the Shared Space and cyclist association's accounts suggested (Section 7.4.2).

Elias (1995) has suggested that current traffic order can be considered to be a moment in a coevolutionary process. Indeed, the different forms of self-organization could also have been observed as one coevolutionary process (compare Chapters 8 and 9 in this volume). The expansion of traffic engineering technologies coevolved with traffic participants' capacities for self-organization. Some see coevolution as leading to cancellation (Section 7.2.2) or interpassivity (Section 7.4), but the situated accounts in the Haren case brought forward many differing assessments. Social and technological self-organization can coexist in many ways. They may even reinforce one another, as the VISIO spokesman suggested. He saw opportunities in both social and technological self-organization, i.e. both in advanced GPS and socially self-organizing solutions (Section 7.4.2). Similarly, the cyclist association representative indicated that the need for separate bicycle lanes depended on traffic intensity. These nuanced views on hybridization are reminiscent of Winner (1977), who explained the contemporary relevance of the Frankenstein saga. The main thrust of this argument is that when they are relied upon unthinkingly, our self-organizing technologies tend to boomerang back onto society.

Intervention in the complexity of self-organization is a difficult matter, once the role of first and second order (Section 7.4.1) observation is fully acknowledged. As far as boundary judgments are made self-referentially to ensure autopoietic continuity, they tend to be exempted from being reconsidered. Therefore, the management of self-organization complexity should not only be sensitive to the differences between (implicit) boundary judgments. It should also be ready to deal with autopoietic self-organization, which urges public managers to take the historical formation of self-organization seriously into account (Section 7.5.2). Throughout this book, several attempts of the typical re-entry can be observed. In the Haren case discussed in this chapter, stakeholders could take a bus tour to experience such disorderly order. Equivalent measures should be sought in other cases of self-organization complexity.

# 8 Coevolution

## A Constant in Non-Linearity

*Lasse Gerrits, Peter Marks, Arwin van Buuren*

### 8.1 INTRODUCTION

Imagine being the Hamburg official quoted in the introduction to Chapter 5. It becomes obvious that the occurrence of change events is disruptive to policy processes. Events such as sediment accumulation disrupted the original plans in Hamburg and prevented the straightforward implementation of the next deepening operation. This was a clear setback from the perspective of the port authorities. The important question is whether or not this occurrence could have been avoided. The argument presented in Chapter 5 is that the occurrence of change events is inevitable and that disruptions to the policy process will continue to occur regardless of the efforts made to control it. However, understanding the occurrence and nature of unforeseen and sometimes unfavourable events could shed some light on the sources of disruptions to the policy process.

This chapter attempts to open that black box by substituting the anthropocentric perspective, where the decision-maker is in complete control, for the coevolutionary perspective, which shows that change is often the result of coevolving systems, well outside the direct control of decision-makers. We return to the Hamburg case and also look at another similar case, the management and development of the Westerschelde estuary in Belgium and the Netherlands, in order to demonstrate how a coevolutionary understanding of system change can enhance our understanding of unintended, unforeseen and sometimes unfavourable change.

The concept of coevolution is often used in complexity theory. Its use varies from a generic understanding of mutual influence between systems (cf. Mitleton-Kelly, 2003) to understanding the patterns of selection pressures and reciprocal selection (cf. Norgaard, 1984; Gerrits, 2008). This chapter takes coevolution to mean reciprocal selection between systems, a process during which future states of systems are selected reciprocally by other systems. As systems are nested, coevolution is not restricted to one level, but following the discussions in Chapters 1, 6 and 7, the concept of self-organization is much more apt in understanding the behaviour of individuals and groups. Coevolution surpasses that level.

In order to answer the question of what drives change, the process as well as the patterns driving that process longitudinally must be analyzed. Feedback is the core process between elements and systems. It is through feedback that systems continue to develop in the quest for a better fit with their environment. Continuous dynamic analysis, as per the discussion in Chapter 3, should cover the feedback loops and the punctuated equilibriums resulting from feedback. A constant process of coevolution is noticeable between (nested) systems.

A conceptualization of coevolution is presented in the next section. Section 8.3 utilizes the conceptualized elements and mechanisms of coevolution to analyze the cases of the Westerschelde and Unterelbe estuaries, which are perfect examples of how social and physical systems coevolve from one temporal state to another. How patterns and concepts of coevolution can be used for an analysis of public policy processes as well as how it may be used as a guiding principle for public managers is the subject of the next chapter (Chapter 9), authored by Van Buuren, Gerrits and Marks.

## 8.2 CONCEPTUALIZING COEVOLUTION

Evolution is the change of elements—species, systems, actors, technologies—across a certain time span. Elements change because they have an incentive to do so, when they are under certain pressures. The social phenomena under investigation in this book are connected with other social phenomena. Elements may adapt themselves to new situations, but other connected elements may adapt as well. In other words, systems are not evolving in an isolated environment; their environment evolves as well, and this environment consists of other systems and actors within these systems. Evolution is thus not a unilateral cause–effect relation, but a mutual process between all elements in a particular case. According to Mulder and Van den Bergh (1999), all evolution is in fact coevolution as soon as there are two elements influencing each other. Thus, when we talk about the change of things in the social world, we talk about coevolution: the ongoing process of mutual adjustment between interconnected elements. Mutual adjustment is not a generic term; it consists of patterns of reciprocal selection. This is explained further in the following sections.

### 8.2.1 Systems not at Rest

Systems coevolve with other systems over time. That is, there is a continuous process of mutual adjustment since the high variety of systems cause them to constantly adapt to new situations. Contrary to the assumptions made in first generation systems theory, systems never achieve an optimal or definitive equilibrium. One way to understand this is by looking at the development of economic systems. Evolutionary economics centres on the

observation of temporal equilibriums rather than permanent equilibriums. Apparently, there are numerous equilibriums and systems appear to jump from one stable state to another. In the vocabulary of evolutionary theories, such states are called attractors. The group of attractors describing all possible future states of a system form a phase space (Gleick, 1987), a state space (Kauffman, 1993) or an attractor basin (Arthur et al., 1997; Martin and Sunley, 2006). Thus, systems are located in attractors and have a number of possible next states available, termed the attractor basin (see also Gerrits, 2008).

From an evolutionary economics perspective, economic systems contain large numbers of heterogeneous agents interacting simultaneously that drive economic change through its heterogeneity. The interaction between economic agents takes the form of competition and cooperation. Competition structures economic activity and selects the best fit outcome, e.g. the best organizational arrangements. These selection processes destroy and create variety, which is the driving force of change in (economic) systems (Foster and Hölzl, 2004: 3–4). Although systems can achieve balanced states, these states are temporal at best, if they are ever reached.

### 8.2.2 Coevolving Social and Physical Systems

The notion of coevolution stems from biology. Norgaard (1984, 1994, 1995) developed the idea to apply this biological notion to the interaction between physical systems and social systems. He reflected on the idea of progress as a linear trajectory towards a certain goal and concluded that this perspective does not do justice to the complexity of social and physical reality. More specifically, whereas modernism regards the relationship between these two types of systems as hierarchical, Norgaard deems this relationship to be mutual and reciprocal or of a coevolutionary nature.

Development constitutes an ongoing struggle through the attractor basin towards an uncertain future where the next attractor is the result of the interactions between social and physical systems rather than the result of an action by one particular actor or systems. Coevolution is not a process that can be controlled. Systems develop and actors are dragged along, although they have the potential to generate some influence through their actions that cast selection pressures on elements to change. However, to control the process is an entirely different matter, even if such ambitions exist.

As argued in Chapters 4 and 5, systems develop in a non-linear manner that actors experience as erratic and unpredictable. Systems coevolve without one system constantly steering the other. Norgaard therefore shows that the idea of coevolution has considerable consequences for an understanding of system dynamics.

### 8.2.3 Nested Systems and Boundary Judgments

Not only are systems and their (horizontal) interactions complex in and of themselves, but they are also part of a larger complex system and comprise of smaller systems within themselves (Byrne, 2005). Interrelatedness and feedback occur both horizontally and vertically as well as within and between all the (nested) systems. All these levels of interaction have the potential to influence one another. As argued in Chapters 1, 3 and 7, system boundaries do not exist a priori. What constitutes a system is a matter of judgment by the actors comprising the system as well as by observers. This means that depending on what one wants to know, the systems and their boundaries are defined by the analytical questions of the observers. In other words, boundaries and systems are not given, but dependent on the focus of attention: the system and its boundaries in one scenario may be nested systems in another, or vice versa. The ‘policy system’, a term that will be explained and adopted later in this chapter, is therefore not an entity that exists outside actors’ interpretation but an account of the actors interviewed in this chapter.

### 8.2.4 Adoption, Adaptation and Types of Coevolution

In the vocabulary of complexity theory, the basic elements of systems are known as agents. In the domain of public administration, however, describing these elements using such a generic term is insufficient. Agents can be individuals but they can also be (nested) systems, e.g. organizations, departments, ports and rivers. A distinction can be made between active entities and passive entities. Actors are active entities: they exhibit adaptive behaviour and are able to adapt themselves to changing environments. Agents are passive: they exhibit adoptive behaviour, because they process information but do not actively seek to fit within the system. Agents and actors make up a system, but that system itself can be an adaptive agent among others in a bigger system, which in turn may be another adaptive agent in an even bigger system (cf. Holland, 1995).

Odum (1971) has developed a categorisation of mutual interactions depending on the type of result for the systems involved. His classification also takes into account the size of the population, which allows for a distinction between the predator and the prey, or the parasite and the host. Since it is argued here that systems are essentially social constructs and that their size is therefore variable, it is not possible to replicate this in the context of social systems. However, his classification provides a starting point from which to understand the behaviour of agents and actors alike in coevolution and the consequent results of their behaviour. This in turn can help practitioners to understand which pattern of behaviour could promote a certain type of coevolution, allowing them to reconsider their strategies from a coevolutionary perspective.



In cases where the state of all systems alters to a state that constitutes degeneration for all concerned, this type of coevolution is categorised as *interferential*. This can occur when actors attempt to adapt or adopt using what they deem to be the best strategy that could actually mean a worsening. Collaborative policy processes may sometimes exhibit this type of coevolution: actors try to find a compromise that is acceptable to all, but the overall result does not match the actors' expectations. The 'tragedy of the commons' is another example.

However, when agents manage to position themselves in such a way that their system evolves into a favourable state at the expense of other systems, this type of coevolution is characterized as *parasitism*. Due to power differences, this type of coevolution can be easily seen in many adversarial policy processes. In cases where the adaptation or adoption means a progression towards a more favourable state than before as perceived by all the actors involved, this coevolution can be characterized as *symbiotic*: the coevolution leads to results that do not come at the expense of anyone or anything. It should be noted that not all interaction leads to changes in systems and therefore to coevolution, or that coevolution can take place through interrelatedness (unintended or intended) or combinations of interactions and interrelatedness.

Actors as agents look for appropriate ways of acting and responding in complex environments. What is appropriate and why would actors want to act accordingly? Assuming that actors want their intended effects to be realised, they are required to define a desired future state, assess the current situation and attempt to undertake the actions that they consider to serve the end. Since other actors act and react as well, and at the same time, obtaining the right effect is not an easy task—the environment of an actor moves on at the same time that an intention is executed. Simply put, the better an actor can obtain its desired effect in that moving constellation, the better its fit.

## 8.2.5 Shaping the Process of Coevolution

The process of coevolution is shaped by a number of developments: feedback, attractors, punctuated equilibrium and reciprocal selection. *Feedback* is considered to be the driving force in and between coevolving systems. Feedback in systems is the return of a portion of the output of a process or system to a certain input. Feedback is a process surging both horizontally and vertically through the networks and can have different types of impact (Norgaard, 1994). Actors and systems attempt to adjust to the new situation in which they work to achieve their goal. Since every actor or system attempts to do this, the situation around them is constantly changing. Systems and actors do attempt to adjust to this constant change and do find temporal equilibriums. As mentioned before, these *attractors* are the situations—desired or undesired—that are temporally hard to escape because of feedback surging through the systems. Definite

stable equilibriums do not exist, and dynamics create systems that attempt to achieve new equilibrium states because of the changed conditions and pressures: i.e. *punctuated equilibrium*.

The basic idea of punctuated equilibriums is that there are a number of possible states in which a system can rest, as it were, for a limited amount of time: the attractor basin. Systems, then, go through periods when everything is seemingly at ease, albeit not stable, as well as periods of severe fluctuation in the process of changing from one attractor to another. Punctuated equilibrium is essentially about the changes in the velocity of changes: more changes take place in some moments than in others. Coevolutionary changes do not stem from the moment the change is perceived but rather from the build-up of pressure during periods of relative stability. Once a system has moved to a new attractor, it is difficult to undo that change (Van den Bergh and Gowdy, 2000).

The connection between all these elements can be depicted in the following figure, which is the representation of a theoretical attractor basin. Depending on the initial conditions (see Chapter 1), possible chance events that may occur (see Chapters 4 and 5) and the feedback surging through the system, the system undergoes pressure to move to a certain temporal stable equilibrium; that is, towards an attractor ( $w^i$ ,  $x^i$ ,  $y^i$  or  $z^i$ ). Once the system reaches an attractor it can move out of it and towards another attractor, but the amount of energy required may be quite large because of the existing feedback pushing towards the existing equilibrium. However, because of the (constant) dynamics, the conditions, chance events and feedback may change and other new attractors may come into existence. In other words, on a longer time scale the cycle starts all over again and another basin exists in which the system may move to another attractor; i.e. punctuated equilibrium.

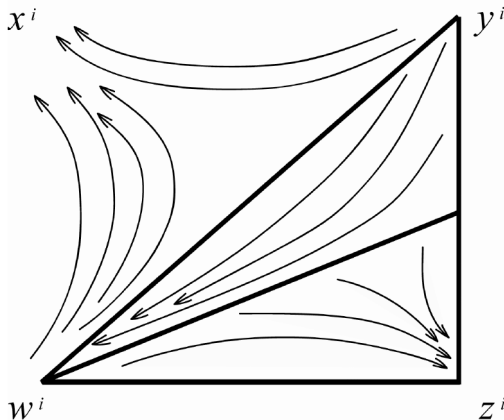


Figure 8.1 The attractor basin.

What is of importance here is the fact that, due to information constraints (see e.g. Simon, 1991), actors are only capable of observing a limited amount of the attractor basin. This view of the attractor basin can be altered by engaging in research and by connecting with actors that have alternative views. The part of the attractor basin that an actor can oversee is called the attractor basin. This is indicated by the solid lines in Figure 8.1, which demonstrate that a given actor fails to observe attractor  $x$ . The actors make decisions based on the projected attractor basin. The consequences of the decision cast selection pressures on the systems. In order to clarify the process of coevolution empirically, two case studies will now be presented.

### 8.3 UNTERELBE AND WESTERSCHELDE

Empirical data for these case studies was gathered through interviews with 50 respondents, analysis of the relevant policy documents and analysis of over 300 newspaper articles published on these issues. See Gerrits (2008) for a more thorough and extensive study. In both the cases of the Elbe and the Westerschelde, several systems that are the units of analyses are interrelated: the natural or physical system of the estuary, the social system of interest groups, lobby groups, inhabitants and the policy system, which consists of the main policy actors related to the estuary (e.g. water managers, port authorities, etc.). As mentioned in the introduction, the boundary between the policy system and the social system is one constructed by the respondents. Thus, a policy system includes actors considered to be a part of the decision-making process. Managing the estuary (to enable shipping, for example) means influencing the behaviour of this physical system and reacting properly to changes within this behaviour. Therefore, coordination between the social system (economical, recreational and environmental interest groups) with its own interests, strategies and actions and the policy system is necessary to realise legitimate and effective collective action.

#### 8.3.1 The Unterelbe

As mentioned in Chapter 5, the Unterelbe estuary and tidal river in Germany, the physical system in this case study, meanders from the North Sea at Cuxhaven to the port of Hamburg and provides maritime access to this port. It also features some natural elements that are important for (estuarine) ecology, such as shoals, sandbars and floodplains (see Map 5.1).

Because the port authorities want to keep their port accessible to the largest ships and because the ever-changing morphology and relative shallowness of the Unterelbe can hinder shipping, the authorities want to

dredge the waterway for maintenance and occasionally deepen the main navigation channel. The most recent deepening of the Unterelbe was finalized in December 1999. Since then a monitoring program has been initiated in order to follow the consequences of the deepening. The port authorities have been preparing a new deepening operation since 2002, to be completed in 2008.

The policy system consists of the main policy actors who cooperate in order to facilitate the further modification of the Unterelbe. Because of the way in which the Free Hanseatic City of Hamburg is organized—with the federal state and the municipality converging—these policy actors routinely work together. There are a number of research institutes affiliated with this policy system.

The Unterelbe flows through two other federal states—Niedersachsen and Schleswig-Holstein—before discharging into the North Sea. Although these states and their constituent municipalities are policy actors in the strict sense of the term and even have some authority over the Unterelbe, they are not included in the policy system of the City of Hamburg. The reason for this is that they do not share the eagerness of Hamburg to deepen the Unterelbe. They fear an increased risk of flooding and environmental damage and are also searching out ways to develop ports within their own territory. As such, their stance alternates between cooperation and obstruction.

A number of actors who are a part of the stakeholder environment of the Unterelbe are not included in the policy system and form the social system around it. These are the environmental pressure groups, the recreational shipping associations and the fishermen. The environmental pressure groups oppose further modification of the Unterelbe, because they fear that the environment is unable to cope with the strain. The fishermen and the recreational shipping associations fear that an increase in the number of cargo ships and the increase in their size limit the possibilities of their breadwinning activities or hobby. There are also complaints that the deepening leads to sedimentation of the small ports along the banks.

There is a clear distinction between the social and the policy system as the latter distinguishes itself by its singular mission: to deepen the Unterelbe, while this mission is controversial in the social system. These three systems generate selection pressures on one another. These pressures are summarized in Table 8.1 and lead to several coevolutionary changes over time, which are discussed in the next section.

Operations to modify the Unterelbe, making it suitable for economical utilization and protecting the people living behind the dykes go back to the beginning of the twentieth century. This case study begins in 1996. While there was a rush to execute a deepening at that time, because the current depth of the Unterelbe was deemed insufficient, there are also a number of physical developments that require attention. First is the problem

Table 8.1 Initial Selection Pressures (January 1996–December 1999)

Pressure on:	Pressure from:		
	Physical system	Policy system	Social system
Physical system		Continuous modification of the Unterelbe for better utilization and port expansion.	Continuous utilization of the Unterelbe for (recreational) shipping, fisheries.
Policy system	Natural characteristics hinder expansion of the port.		Societal protest against the continuous modification of the Unterelbe.
Social system	Natural characteristics can cause flooding but ecology requires preservation.	Preventing and stopping societal resistance against continuous modification.	

of handling dredged material. There is continuous sediment accumulation that requires maintenance dredging operations. However, there is a lack of capacity to store or remediate the dredged material. The increasing tidal range is an issue at this stage as well. The increasing tidal range indicates a change in the relationship between ebb and flood in the tidal river and as such may indicate an unfavourable change with regard to sediment transportation. Any increase in sediment accumulation is considered a threat.

The two federal states of Niedersachsen and Schleswig-Holstein take an ambiguous stance toward the deepening. They agree with the argument that the region as a whole can take advantage of the further development of the port of Hamburg. At the same time, they oppose the deepening because they believe it compromises the safety of their dykes and fear that they may have to pay for environmental damage.

All pressures have a selection capacity on the process of managing and developing the Unterelbe. They mark the bandwidth between what is feasible and what is impossible. However, selection pressure is processed through the policy action system, which enables actors within the system to provide direction to the process by applying selection mechanisms.

### *Applying Selection Mechanisms (January 1996–December 1999)*

In order to obtain an idea of the future possibilities and to deduce the actions required to achieve the desired future, the policymakers use four selection patterns. Its response to pressures and its composition can be managed by managing the *connections* between actors within the system on the one hand and the actors within the environment on the other. With regard to the *composition* of the policy action system, the actors within

the system appear to be inclined towards assimilating actors who are in favour of a deepening, whereas actors who oppose the deepening are kept at a distance. In order to understand how a deepening can be carried out with minimised unfavourable results, *research* needs to be carried out. Research is also imperative because such large projects require an environmental impact assessment. The *scope* of the project is set and clearly not changeable. The first and most important aim is an efficient deepening of the navigation channel in the Unterelbe. Complementary measures are only considered when they are required in order not to obstruct the primary goal. The decision to deepen has already been made and this is a point of no return for the policy action system. While the process of assessing objections may still be in full swing, policymakers do not await the outcomes and instead begin right away under the banner of 'preparatory dredging'.

The policy action system is caught in a vicious cycle during this phase. The diversion of alternative events and ideas that may disrupt the dominant way of thinking reinforces the belief that the right thing has been done. This in turn reinforces the dominant belief in the righteousness of deliberately diverting away selection pressures that may alter the dominant course of the system. Such a regime means that selection pressures no longer affect the policy action system, leading it to believe that it has done things in the correct way because there is no one to tell it that it has not. Consequently, the policy action system is confirmed and reconfirmed in its current way of acting. However, as the case shows, the pressures that could disturb the process are only diverted away, they are not dissolved nor processed in any way. Later, they become visible again and can no longer be neglected.

### *The Projected Attractor Basin (January 1996–December 1999)*

In terms of our theoretical framework, the actors within the policy action system build a scenario for the desirable future state of the physical system, based on the selection pressures and the way in which policymakers deal with them. This consists of three parts: an image of the current state of the physical system, the desired state of that system and the measures that are required in order to achieve that state. In other words: it defines an image of the future attractor basin and from that projected basin it chooses a desired attractor of the physical system and the social environment, without fully knowing the actual attractor basin. The next chapter deals with the contents of policy processes aimed at creating a desired future in more detail.

What actors see is what they have, consciously or unconsciously, selected from the attractor basin, or what has been forced upon them through selection pressures. The attractors or future stable states of the Unterelbe as articulated by the policy action system therefore do not represent the full attractor basin but rather, the projected attractor basin, i.e. the part that is observed and understood. The main target for the future stable state of the Unterelbe is a deeper Unterelbe with little room for contextual development.

There are some premature ideas about the management of the sediments and in the end, the planners settle for aquatic dispersion in the Unterelbe. There are also some ideas about compensation measures that are required to keep the Unterelbe in that future state. With regard to the social environment and its actors, the policy action system opts to serve the demanding parties such as shipping and trading companies exclusively and chooses not to address the concerns of those who oppose the deepening.

### *Consequences of Selection and Action (December 1999–October 2004)*

The selections made by the policy action system during the planning and execution of the deepening are not without their consequences. The accumulation of policy decisions exerts a continuous strain on the physical system that results in a change in the state of the physical system that partially fulfils the desires of the policy action system (a deeper Unterelbe), but that also brings with it a sudden increase in sediment accumulation and a changed tidal regime that may threaten the ambitions of the policy action system. The accelerating sediment accumulation in the harbor means that the port authorities have to double their dredging efforts—something that, given the lack of capacity to manage the dredged material, is very difficult and costly. Moreover, it comes with a change in the tidal range that leaves the city channels' riverbed exposed during periods of ebb.

The singular focus on the desired state of the Unterelbe (a deeper channel) also has an effect on the societal environment of the policy action system because the drive to have the Unterelbe deepened results in societal concerns not being addressed and instead being diverted to the future. This is reinforced through the political change in the Hamburg senate. The unexpected change at the federal government level (from SPD to CDU) allows Hamburg to get its deepening but also reinforces social opposition. In other words, the selection pressure to continue the utilization of the Unterelbe as an economic asset gains momentum through the political change but also regenerates the societal opposition against further modifications of the Unterelbe.

### *The Actual Attractor and its Selection Pressures (December 1999–October 2004)*

The difference between the projected attractor and the actual attractor of the physical and social systems results in pressures on the policy action system because it creates a situation that, far from the desired future, provides a future with considerable problems for policymakers. They are now obliged to deal with the physical changes and social opposition, both of which stem from their earlier decision but did not feature in their future plans. Singular decision-making, in which the project is narrowed down to a single goal and in which the decision is made not to address certain issues,

results in the diversion of these issues. They are diverted to the future, meaning that they return as selection pressures later on—they do not disappear. These pressures are part of the new attractors.

Societal resistance has also not diminished. Instead, the policy action system encounters increased resistance because of the way in which societal actors were treated during the earlier deepening operation. Finding a joint solution with the environmental pressure groups becomes a more pressing concern when it is ruled that these groups are now entitled to file a complaint during the official planning process, a development from the situation during the previous planning procedure.

The new state of the physical system also raises concerns from societal actors as they perceive that the previous deepening has caused exactly what they feared it would cause: an increased tidal range, erosion of sandbars and beaches and with that, an increased risk of dyke collapse. The policy action system encounters this resistance during the years that follow and especially during the new planning process for the next deepening. It pressures policymakers to adopt a new strategy in order to deal with these public concerns, as a new round of deepening is not likely to be accepted by the public and by the neighbouring federal states.

It becomes clear that the policy action system has manoeuvred itself into a position in which its regime becomes increasingly challenged through the pressures it has attempted to divert away in the past years. The selections made by the policy action system appear to backfire on it in several ways, in both the physical and societal dimensions of developing the *Unternelbe*.

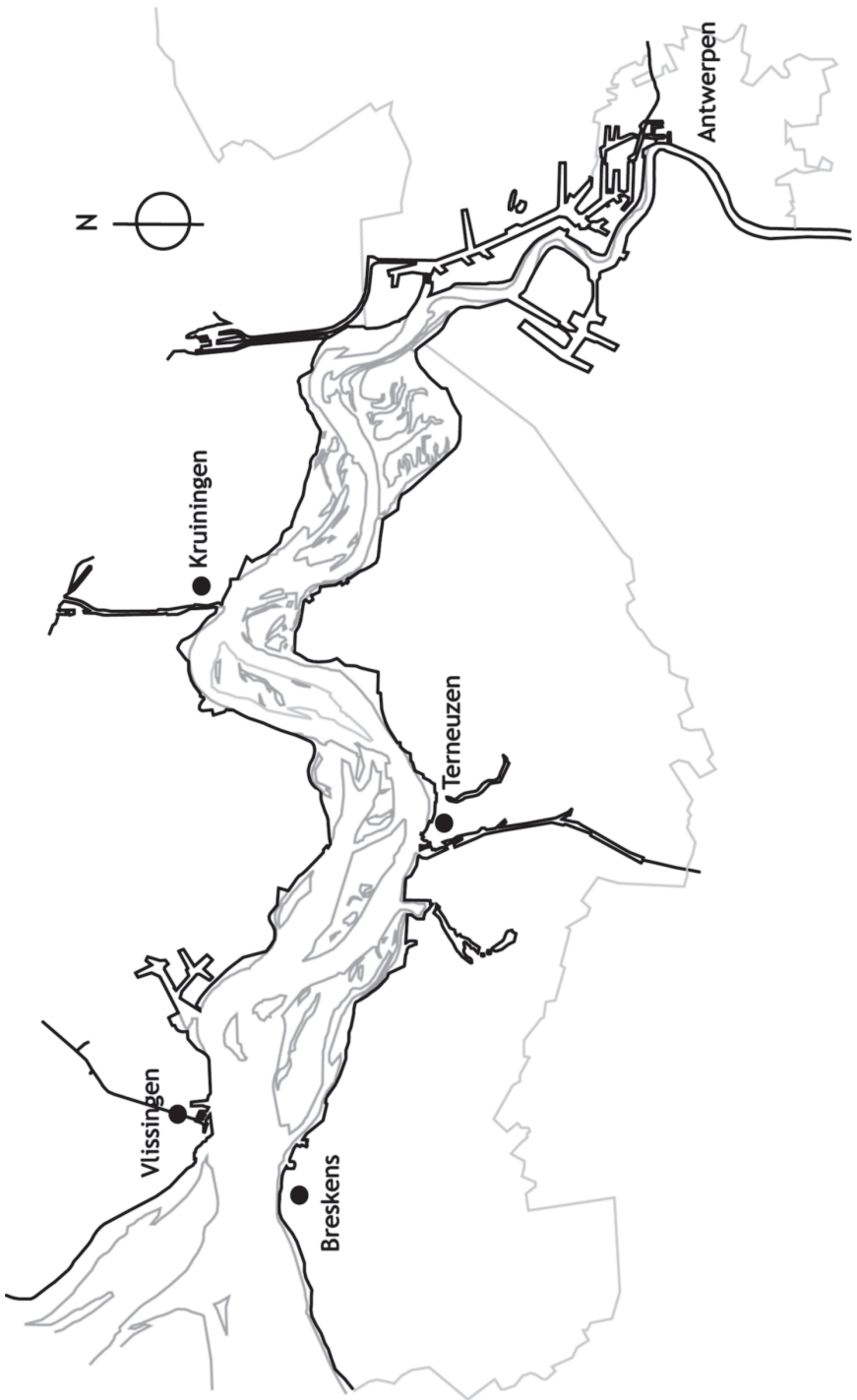
### 8.3.2 The *Westerschelde*

The *Westerschelde* estuary in the southwest of the Netherlands runs from the North Sea to the border with Belgium and the port of Antwerp. Like Hamburg, Antwerp is one of Europe's largest ports. The authorities at the Port of Antwerp aim to deepen the estuary in order to facilitate the movement of larger ships. The *Westerschelde* also features important natural areas and the dissipative character of the riverbed forms a threshold against floods.

Because the estuary is located on Dutch territory, the authorities of Antwerp are required to obtain a Dutch permit for deepening operations. The most recent deepening took place between 1997 and 1998. This operation was the outcome of a long negotiation process that lasted almost 30 years. Final permission was provided after the Flemish authorities agreed with the construction of a high-speed railway link between Flanders and the Netherlands, thereby granting an old wish of the Dutch government.

The policy system consists of actors who are working on the management and development of the estuary. Unlike the *Unternelbe* case, these actors are not necessarily aiming at a deepening—the fact that the estuary falls under Dutch authority means that there is no dominant orientation





Map 8.1 Westerschelde

towards deepening the estuary. The strong convergence of port authorities, authorities for managing waterways and research institutes as observed in Hamburg does not occur in the Westerschelde case. Still, it should be noted that there are strong ties between actors within the policy system—especially between the Dutch governing authorities and the research institutes, but far less between the Flemish and the Dutch actors.

The social system consists of actors who are in any way opposed to the further development of the Westerschelde. The environmental pressure groups are very similar to those in Hamburg with regard to their objections and wishes: no increase in the utilization of the Westerschelde by cargo ships and a restoration of the old situation in which the estuary has more room to develop. The agricultural organizations are strongly against this and against further development, as they fear that this means the conversion of agricultural land into floodplains and hence increases the risk of more floods. The different systems and their pressures are summarized in Table 8.2.

The Flemish actors (Port authorities, City of Antwerp, the Flemish government), rather than the policy action system, lobby for a deepening of the Westerschelde. Consequently, the pressure to deepen the Westerschelde is not self-generated pressure from the perspective of the policymakers but rather selection pressure stemming from a specific group of actors from the societal environment.

There are a number of different pressures. The strongest one, and the one shared by actors in the policy action system such as Ministry of Public Works and Waterways and the local authorities in Zeeland, is not to give in to the desire to deepen. There are three categories of motives for

Table 8.2 Initial Selection Pressures (July 1993–May 1999)

<i>Pressure on:</i>	<i>Pressure from:</i>		
	<i>Physical system</i>	<i>Policy system</i>	<i>Social system</i>
Physical system		Continuous modification of the Westerschelde for better utilization and port expansion.	Continuous utilization of the Westerschelde for shipping, fisheries and land reclamation.
Policy system	Natural characteristics hinder expansion of the port.		Societal protest against the continuous utilization of the Westerschelde.
Social system	Natural characteristics require nature protection—in turn requiring conversion of agricultural land.	Attempting to facilitate societal unrest over a deepening in a deal.	

opposing this. Firstly, there are actors who feel that a deepening will only benefit the port and city of Antwerp while the Dutch region would not receive anything. Secondly, there are actors who oppose deepening because of environmental concerns. Finally, there are actors who fear that a deepening of the estuary requires compensation for environmental damages. Such compensation would be at the expense of agricultural areas and probably also require the realignment of dykes, which is a very sensitive topic in the region because of the catastrophic flood of February 1953.

Physically, no immediate pressures are observed apart from a number of developments that may indicate a trend. Some researchers state that the eastern part of the Westerschelde is becoming increasingly rigid and that this harms the dynamic nature of the estuary and reduces its ecological value. However, this poses no immediate selection pressure on the policy action system. Once a deal regarding the link is put in place, agreement over the Westerschelde is forthcoming.

While the decision to deepen is nearing its conclusion, the pressure to broaden such an operation to include a more versatile development of the Westerschelde that includes nature restoration gains momentum. The policy action system must respond to these diverse pressures through the application of the selection mechanisms.

### *Applying Selection Mechanisms (July 1993–May 1999)*

The policy action system displays an ambiguous stance: it opposes an operation but at the same time realises that it is also reasonable to grant a deepening. Once the agreement is reached and the deepening has to be planned, the policy action system acts rather quickly.

The handling of *connections* by the policy action system is not single-sided as it alters its stance from rejecting a deepening to accepting it. In doing so, it alienates actors who oppose the deepening of the Westerschelde from the policy action system as the latter is no longer clearly blocking changes to the estuary. At the same time, the policymakers must cooperate with the Flemish actors in order to plan the deepening. This provides an incentive for the opposition to organize themselves within the Administrative Consultation Westerschelde (or BOWS) initiative in an attempt to counter the pressure to deepen. The policy action system attempts to avoid delays by constantly reducing the opportunities for the opposition to protest. Altogether, this means that the *composition* of the policy action system remains fairly stable. *Research* on the deepening of the Westerschelde is meant to facilitate the planning and execution of the operation. No alternative scenarios are investigated, nor does the research extend to adjacent areas. Knowledge of the developments within the physical system is available but at the same time rather fragmented between the actors in the policy action system. The *scope* of the project is narrowed down to a deepening and the obligatory compensation. However, since the pressure to get the

operation done as quickly as possible remains the priority, compensation is not really thought through and at the time of planning there are only a few ideas on paper that are not very concrete.

### *The Projected Attractor Basin (July 1993–May 1999)*

During the planning of the deepening, the policy action system formulates its goals for the future state of the estuary and, based on the current state of the Westerschelde, it also formulates the means to that end. In the vocabulary of the theoretical framework: it develops an image of the future attractor basin and from that chooses an attractor as the desired future stable state of the physical system and the societal environment, including the way to achieve that state. As the selection pressures push the policy action system towards a deepening and as the system itself applies selection mechanisms, it defines a projected attractor basin.

Clearly, the main goal is the deepening of the Westerschelde and complementary measures are not considered for inclusion in the process except for the obligatory compensation. Although the damage incurred by the deepening operation is not defined as part of the future attractor, it remains a part of the attractor basin as it is investigated in the long run.

The policy action system accepts that the deepening will provoke resistance from a part of the societal environment whilst serving the part of society that requires the deepening, i.e. the Flemish actors. This leaves a number of actors dissatisfied but that is taken for granted and, if possible, is dealt with in a legal way. At the same time, it is acknowledged that those who oppose the deepening raise pertinent concerns that are shared in the policy action system. Again, these are diverted away for the time being, with the intention of being dealt with later. In any case, these concerns are known and acknowledged as being relevant and they are therefore part of the projected attractor basin.

### *Consequences of Selection and Action (May 1999–December 2002)*

The main consequence of the selections made and the actions carried out is a deeper Westerschelde as part of a singular project, i.e. a project with a narrow scope. The deeper Westerschelde does not appear to create unfavourable side effects, at least not at the time, so the operation constitutes a negative feedback loop, i.e. it achieves the expected (temporal) equilibrium. The constant rush for a more comprehensive development perspective for the Westerschelde leads to dissatisfaction within the policy action system. A working group is established that can be regarded as a response to the selection pressure to develop a more comprehensive plan before engaging in another deepening operation.

The point of departure is that further development of the estuary must be conducted within the sustainability framework. A project organization,

ProSes, is created to develop a concrete plan in which a deepening is paired with ecological development while maintaining or improving the safety conditions along the estuary. Although the (singular) deepening of the Westerschelde has not yet sparked off any major physical changes, the singularity attracts the attention of the European Commission (EC). A narrow scope, limited research and relatively closed connections were supposed to safeguard the project from further delays but this now backfires on the policy action system as the EC decides to investigate the lack of compensation measures. The nature of the operation also triggers an investigation by the Court of Audit. Their main finding is that motives and means for the previous deepening were not as sound as required by law. Observing that the policy action system is not very willing to facilitate another singular deepening after the previous operation is completed, the port authorities establish the Port of Antwerp Expert Team to counter the idea that further deepening of the Westerschelde is harmful and to prevent potential delays.

*The Actual Attractor and its Selection Pressures*  
(May 1999–December 2002)

The operation leaves the Westerschelde deepened, which corresponds with the expectations of the projected attractor basin made by the policy action system. Although there are no immediate unfavourable physical changes, there are many actors who wish for a different type of development in the future. The first pressure from the current state of the estuary is therefore to search for a more comprehensive development of the Westerschelde. This is reconfirmed through a subsequent string of initiatives that pursue such a comprehensive development. Substandard physical compensation for the deepening attracts attention from the EC and the Courts of Audit. Their findings add to the pressure to adopt a more considerate approach towards the Westerschelde.

There are also pressures not to develop such an approach but these follow in response to this change in the stance of the policy action system rather than from the actual physical state. Similarly, societal unrest in Zeeland with regard to the possible consequences of compensation and nature development on the actual land use, leads to pressure not to modify the Westerschelde at all.

The actual state of the physical system conforms to the intentions of the policy action system while, at the same time, there is doubt as to whether another operation will be desirable. The actual societal environment involves, as expected, the Flemish actors demanding a new round of deepening while the many actors in Zeeland province oppose any change. Together with the other pressures, this leads to a diffuse mix of pressures on the policy action system. Although there were no major unfavourable developments after the deepening, pressure continues to be put on the policy action system because of the dissatisfaction among many actors regarding the actual state of the estuary.

## 8.4 CONCLUSIONS

Coevolution between the policy system and the physical systems takes place, regardless of any ideas about its desirability or direction. Both cases show that policy systems have to and do respond to physical developments (Untereibe) and even to the possibility of a physical development without that development actually taking place (Westerschelde) through a redefinition of their systems' disposition and boundaries. Similarly, physical systems respond to policy systems by adapting to the newly created situation, such as dredging operations or deepening operations. These adaptations lead to pressure from the social system because of its perceived undesirable effects. The policy system then responds to this again. In this way, a complex pattern of interrelatedness and interactions emerges between the three systems. The process of coevolution between and within the systems, i.e. mutual influence through selection and adaptation, does not occur in a linear and smooth fashion. The physical system shows that changes sometimes occur unexpectedly and sometimes not proportionally to the incentive. The policy system shows similar developments. It takes considerable system pressure for changes to take place, but once these changes do occur they can be far-reaching and become out of the control of the policymakers. This results in new but temporal and dynamic equilibriums. To put it more precisely, the process of selecting the future attractor is influenced by the dynamics of the physical system, social system and policy action system. There are six aspects of this.

Firstly, although the policy action system made intentional selections with regard to the desired future attractor of the physical system, it was also subjected to blind selection stemming from earlier decisions that led to adverse effects, accidents and events. The actual physical developments brought and kept the estuaries in an attractor that yielded unfavourable results or the threat that this could happen soon. Such was the situation that, in both cases, the policy action system had to respond to these problems—each in their own particular way. The attractor basin was limited not only by deliberate choice from the policy action system but above all by the actual physical developments—especially because the new stable states proved to be persistent.

Secondly, there is a non-linear relationship between the selections made by the policy action system and the consequent responses. Such responses did display a punctuated nature with changes taking place elsewhere in time. Therefore, the policy action system could face a new, unintended situation. Together with the complex causation between physical change and measures from the policy action system, this could render change unintended, unobserved and unexpected.

Thirdly, upon facing this uncertainty, the policy action systems responded to the selection pressures stemming from these situations by altering the selection mechanisms and with that, the disposition of the system. By and

large, there are two types of responses, as argued in Chapters 6 and 7. The first type of response is characterized as autopoietic self-organization. Such 'singular' policy action systems respond to selection pressures by connecting with those actors who support the goal of the policy action system and by shielding the process from those who oppose it. This results in a narrow scope of the project and consequently in research exclusively aimed at finding the means to that narrow predetermined end. In other words, the boundaries are redefined in such a way that it enables the system to cope with selection pressures through reinforcement of the internal coherence in an attempt to keep the project under control as it is deemed to be complex enough already without factors that are considered distracting.

However, such an approach can become unacceptable if the selection pressures that were diverted backfire on the policy action system, forcing it to alter its regime. The second type of policy action system is characterized by a composite nature and is labelled dissipative self-organization by Pel in this book. Actors within this type of policy action system redefine their systems' boundaries and enable it to connect with other actors in order to expand the variety of ideas and goals in the process. This results in a debate that questions the scope, subsequently taking into account more than one aspect of the physical system. Research is also aimed at exploring options rather than only finding the means to a given end. This classification is further explored in terms of managerial strategies in Chapter 11 on project and process management.

Fourthly, while the classification into singular and composite policy action systems may suggest a stable dichotomy, empirically it was observed that the composite characteristics are encapsulated in the singular policy action system but are not always unlocked. A more composite nature is also not the definite state of the policy action system as it can convert (back) into singularity. Change or consolidation of regime was induced by actual unfavourable events or by the perceived imminent risk of such changes. While a change or consolidation may be a response to the selection pressures, it was also observed that both types of systems have the capacity to reinforce themselves. The singular policy action system is driven by its self-referential nature that reconfirms its workings and definition of system boundaries whereas the composite policy action system is driven by further dissipation in an attempt to be comprehensive. Both methods have their advantages and disadvantages, but the latter seems to be better able to generate symbiotic coevolution while the first seems to alternate between parasitism and interferential coevolution.

Fifthly, selections and selection pressures of coevolving systems have a reciprocal quality insofar as the degree of freedom of the policy action system is limited by events and developments outside the intended control of the actors within the system. Not only can the attractor basin containing the possible future states of the systems be compromised through adverse, unintended results and events, but the nature of the policy action system

can also change partly by accident as a singular policy action system may not be aware of its singularity and a composite policy action system may not be able to keep its expansion into more variety under control.

Sixthly, in observing that the policy action systems' abilities are limited outside their intentional control, it is still able to have an impact on the physical system. Singular policy action systems have a smaller chance of taking into account all the possible future attractors of the physical system than composite systems. However, composite systems remain subject to the mechanisms that are inherent in coevolution and their composite nature therefore cannot guarantee that unfavourable developments will take place—it can only reduce the possibility of the occurrence of such developments.

Actors within the policy action system and the dynamics of the policy process have influence over the physical system but this influence is limited or distorted because of the six aspects described here. Policymakers are as much subject to selection pressures from the physical system and the societal environment as they can cast selective pressures on them. Coevolution between the systems is therefore a matter of reciprocal selection with the results not fully determined by intended selections made by policymakers but stemming from the entire complex of reciprocal selections. While parasitism can bring with it favourable effects in the short term, it can relapse into interference because of the reciprocal nature of coevolution. Achieving symbiotic coevolution seems to require dissipative self-organization but there is no guarantee that this will lead to the intended results as the influence of the policy action system is limited within coevolving systems.



# 9 Public Policy-Making and the Management of Coevolution

*Arwin van Buuren, Lasse Gerrits, Peter Marks*

## 9.1 INTRODUCTION

The previous chapter focused on the coevolution between different types of systems. It was argued that a coevolutionary revision of the anthropocentric perspective can help with understanding the occurrence of unintended, unforeseen and sometimes unfavourable events. It allows for a change in focus from the policy actor or a network of policy actors to a contingent focus that highlights policy actors who are entangled in a pattern of mutual interactions between them and nearby systems, including physical systems. These interactions determine the degree of freedom available to policy actors in making their decisions. A relatively small number of events or an unforeseen change event can cause policy actors to lose the initiative and to consequently be dragged along by the events (see also the discussion in Chapter 5).

The discussion in the previous chapter mentioned that the notion of coevolution can be observed at different levels, ranging from systems (as discussed in the Unterelbe and Westerschelde cases) to daily interactions. The research question determines the level that is investigated and constitutes a choice that leaves out other levels. This chapter shifts the focus from system developments to an analysis of policy-making at the level of concrete policy processes that actors engage in. The outcomes of policy processes can be explained by the mechanisms of coevolution within such a process and between simultaneous policy-making processes.

Many scholars have attempted to understand the dynamics of public decision-making processes. Some focus on the impact of scientific knowledge on decision-making, while others study the impact of power distribution between stakeholders. Many look at the ways in which actors exchange resources in order to build coalitions to realise their policy goals (Sabatier and Jenkins-Smith, 1993). The impact of perceptions and value-frames (Fischer, 2003) and the structuring role of formal and informal institutions are also often analyzed (Scott, 1995).

Nonetheless, the vast array of analyses, pathways of public policy processes and their outcomes remain to a large extent unpredictable and

unexplained. Time and again, unexpected moves within policy processes, unanticipated outcomes and unintended effects surprise policy actors. A more profound understanding of the dynamics of policy processes is therefore required in order to explain their development and the decisions that result. The coevolutionary framework can provide such an understanding. By analyzing the sources of dynamics and development, we can better understand the devices to manage policy processes and their outcomes. It is argued here that *policy processes can be conceptualized as complex evolving systems*, composed of different *coevolving tracks* (internal coevolution), and *coevolving with other policy processes* (or systems, external coevolution). Furthermore, we conceptualize *policy decisions as temporal and dynamic equilibriums* (Van Buuren and Gerrits, 2008). These notions are illustrated by a case of a Dutch spatial planning process: the redevelopment of a deep and deteriorating polder in which officials want to realise new functions (water retention, nature), while the inhabitants want the current agricultural use to remain as it is. Sections 9.4 and 9.5 analyze the way in which such a policy process can be managed and how symbiotic coevolution can be found by actors in the policy process, which expresses itself in effective and broadly supported policy decisions.

## 9.2 COEVOLUTION WITHIN POLICY PROCESSES

The concept of coevolution continues to be built upon. While the previous chapter focused on its core concepts, this chapter will look more closely at actors' ability to cope with coevolving processes. *Identity and adaptation* are of particular relevance here. All elements (actors) within a complex process system bring their own identity, history, repertoire and added value to the system. Their added value to the system depends on the way in which they can realise their own potential: by achieving their own objectives, they can survive and thus remain able to contribute to the capacity of the system as a whole, except for situations in which they are solely oriented to their own interest and not able to adjust their interest to formulate a joint interest or common goal. However, they must also adapt to other elements within that system in order to survive and to realise progress in the systems' evolution. The development of the system thus consists to a large degree on the way in which this tension between preserving one's identity and adapting to other elements or actors evolves and is managed (Oliver and Roos, 1999; Stacey, 1995; Flood, 1999a).

The second set of concepts is *convergence and divergence*. Within a complex process system elements have opposing tendencies: they either converge into or diverge away from each other. When the focus is on personal identity (independence, isolation), the elements tend to diverge. When the emphasis is on adaptation in order to realise a collective identity, the movement is towards convergence. These concepts are linked to the concepts

of *conservative* and *dissipative self-organization* described in Chapter 6. Conservative self-organization generates capacity for the system to govern itself and explores its own quality because of the self-referential character of the system (Jantsch, 1980; Chapter 6 in this volume). Hence, it can lead to divergence among singular elements or systems that evolve through their own self-referential capacity and to *parasitic coevolution* (see also the discussion in the previous chapter).

Dissipative self-organization is the requirement for renewal of the system. It has a cooperative quality that creates the possibility for internal strengths to converge in interactive processes, which may then lead to the emergence of new structures and entities. In this way, processes of dissipative self-organization prevent systems from losing themselves in fragmentation and becoming locked in self-referential processes (see Chapter 7).

As has been mentioned before, systems are never at rest. Complex evolving systems do tend to develop towards temporal stable equilibrium states. Due to the diverging and converging tendencies within a complex system, the equilibriums will change time and again. If systems cannot keep themselves in a specific state of *dynamic equilibrium*, they tend to enter into a new phase of change (they are not able to develop a unifying identity from which they can influence their environment in a predictable way) or relapse to inertia (they are not able to adapt to changing circumstances and struggle to survive using obsolete routines until resources become depleted and strategies have withered) (Teisman and Van Buuren, 2007). The final chapter will reflect on these system states in more detail.

### 9.3 POLICY-MAKING: FACT-FINDING, FRAMING AND FUTURE-BUILDING

Traditionally, the policy process is depicted as a linear production process in which phases of problem definition, information gathering, selection of possible interventions, decision-making, implementation and evaluation follow one another. Kingdon (1984) abandoned that perspective and depicted the policy process as consisting of three streams: a stream of participants, of problems and of solutions. Policies result from the (unpredictable) meeting of these three streams in which a policy window is opened. This model is a further refinement of the garbage can model of Cohen, March and Olsen (1972). Teisman (2000) has added to this thinking by presenting the 'rounds model' of policy-making: where policy processes consist of several subsequent rounds, marked by decisions which form the crystallization of the former round, but which are also the starting point of the next round.

These theoretical developments point at an increasing awareness of continuation and fragmentation in empirical policy processes as opposed to the theoretically ideal image of orderly stages between problem formulation and solution implementation in which the objects of policy-making

go through a rational and linear development process. The coevolutionary perspective is a further refinement from the aforementioned models that enhances a further understanding of the intertwined nature of the different elements that constitute the process system of policy-making.

To understand the dynamics in the content of policy decisions and their evolution requires more insight into the different elements that constitute policy decisions. In essence, there are three distinct categories of elements that shape the content of policy decisions and that are fed by the input of the various participants within a policy process. First are the *ambitions* of different actors, who compete with one another in order to realise their own preferred future. Behind these ambitions, actors have their different *frames of reference* with which they perceive the problems they deal with and with which they evaluate policy options. Third, oftentimes a large amount of (fragmented, incomplete and conflicting) *factual knowledge* about the policy problem, the possible solutions and their impact is available or is mobilized by participants.

The analysis presented here thus is devoid of the classical elements of a policy analysis, including actors, venues, procedures and so on, and instead focuses entirely on the *content* of a policy process. A policy decision, formed within such a process, can be seen as a specific constellation of ambitions (measures), frames (problem interpretation) and facts (rational underpinning). This constellation emerges out of a dynamic and non-linear process of mutual interaction and selection between these three tracks: ambitions are put forward and withdrawn, facts are presented and invalidated and frames are defended and neglected. From a complexity perspective, institutional arrangements and actors are not so relevant; the boundaries of a policy discussion are often not determined by institutional boundaries and the ultimate outcomes cannot be explained by focusing upon the behaviour of participants. The content at stake can be originated everywhere and decisions emerging out of the interactions between the different elements could be as much coincidental outcomes as planned and intended ones.

These three elements form—through their continuous evolution—dynamic tracks: a track of will-forming (in which ambitions are selected), a track of framing and a track of fact-finding (knowledge production). These tracks deliver potential input for policy decisions and together constitute specific pathways for policy action. Policy decisions consist of concrete ambitions (such and so is what we want to realise), they refer to the frames of actors (we do not prefer the current situation because of this and that) and they are legitimized with some factual claims (when we do this or that the situation will—probably—conform to our desired situation). In other words, policy processes thus consist of three different tracks: a track of fact-finding, in which scientists and experts produce policy-relevant information; a track of framing in which actors defend their own world-view (a form of conservative self-organization) and try to produce a more or less shared interpretation of reality (problem definition); and a track of

will-formulation in which actors attempt to find an acceptable selection of concrete ambitions (Van Buuren, 2006).

These tracks seem to have much in common, but it should be emphasized that they are mutually different. Ambitions are the concrete measures actors want to implement. They can be different (due to various interests) although actors share the same problem of interpretation and vision on the desirable future. The facts are the authorized products of a process of knowledge production which are accepted by the involved actors. Actors with different frames can accept the same facts but can give them another 'valuation': they can infer other problem definitions out of these facts.

The dynamics of these tracks have their own drivers. Facts are influenced by non-predictable developments in scientific paradigms and knowledge production methods. Frames are influenced by socio-psychological factors and external triggers or learning effects. Ambitions are also influenced by these sorts of factors. These tracks also influence one another in unpredictable ways. However, none determines the other completely. Facts do not determine the normative points of view of actors or their ambitions. Ambitions are not univocally distilled from the frames of reference of actors or the known facts about the problem. Some facts can have such an impact that policy processes undergo a significant change. In other moments, new ambitions are so appealing that actors adjust their frames of reference. Thus, the way in which facts, frames and ambitions influence one another is not linear and also not predictable: that is, tracks within a policy process coevolve because of the feedback surging through the system.

The three tracks can consist of different sub-tracks (i.e. nested systems). That is, different actors mobilize their own (scientific) research reports and begin a battle of analysis, or in different organizational contexts, actors come to different interpretation frames and because of the absence of arrangements for reflection and interaction, the divergence in beliefs grows. Alternatively, the ambitions of different actors are defended in different policy venues (Baumgartner and Jones, 1993) and different governmental layers implement different (or even conflicting) policy ambitions. In other words, several diverging and converging forces are active within each track. Symbiotic coevolution between the elements of these tracks (different factual claims, frames and ambitions) is required to realise collectively accepted facts, shared images and achieve consensus on policy ambitions. Symbiotic coevolution within the tracks is thus an important management objective and can be stimulated by instruments such as joint fact-finding, collaborative dialogues and stakeholder platforms.

However, this analysis focuses on the coevolution *between* the different tracks of fact-finding, framing and will-formulation. This is generally a spontaneous occurrence that is difficult to influence and that can have different trajectories, dynamics and outcomes. Symbiotic coevolution between tracks is also an important management challenge when public managers want to drive the policy process towards a coherent policy decision, based

on robust facts, entailing a coherent and shared vision and consisting of broadly supported ambitions.

In a symbiotic process of coevolution, knowledge production is oriented towards realising frame convergence and shared ambitions: facts promote critical frame reflection and enable the selection of the ambition which is seen as most promising or effective. At the same time, framing is oriented towards achieving consensus on ambitions and about facts. Negotiation (or will-forming) can be successful in realising frame reflection by showing the possible gains of a certain (beforehand not preferred) policy decision and is required to identify useful knowledge: fact-finding focused on the ambitions that are at stake and applicable to making a legitimate selection.

When the different tracks develop in different (institutional, organizational or social) domains, there is a high probability that the tracks start to fragment right from the start and a coherent decision will not be realised. Politicians and officials develop some idealistic policy ambitions within their own safe bureaucracy. For the outcome of a political deal, support has to be found before it can be implemented. Thus, information is spread among potential stakeholders in order to change their minds and to build consensus. Experts and scientists have to deliver the necessary evidence, without knowing the context of the problem and the other values at stake. In such a (rather extreme but not totally unthinkable) situation, the tracks have their own domain, and their integration can be difficult, since these domains do not interact because of limited connections and lack of mutual adaptation. Policy tracks have their own reward system (legitimacy) and therefore they do not depend on one another for survival.

Policy decisions form temporal equilibriums between factual claims, normative points of view and practical ambitions (Van Buuren and Gerrits, 2008). When new ambitions arise, new facts become known or new frames develop, this equilibrium can change and a new equilibrium may emerge. The actual equilibrium is contested in a new round of policy-making. However, for a while the relatively stable equilibrium may stimulate collective action. Those who have power over resources (at least in the short term) indicate through their support of decisions how they intend to reward the behaviour of others. Decisions are therefore constant widely communicated reconfirmations of the status quo.

## 9.4 POLICY FIELDS: COEVOLVING POLICY PROCESSES

The previous section dealt with the dynamics *within* policy processes stemming from the coevolution between different tracks. However, this provides only a partial explanation of the dynamics of policy processes. The other part of this is the coevolution *between* different policy processes (see also Teisman and Van Buuren, 2007). Policy processes can be seen as nested systems within overcrowded policy fields, filled with different policy initiatives

on different governmental levels with different audiences. In the coevolution between policy processes, they compete for survival by claiming resources and attention. Attention and legitimacy are required for a policy process to survive in a very busy and volatile political context. Thus policy processes coevolve with one another. Sometimes, new policy proposals are not possible or acceptable because of existing policies. Sometimes developments within other policy processes cause unexpected breakthroughs or barriers for a new policy initiative.

Policy processes can be connected in different ways. Sometimes the same actors are active within the different policy arenas and institutional sites where policy is constructed. Sometimes the audiences or topics are the same and the proposals have to compete with one another through creative competition. When policy processes are initiated at the same governmental level, politicians and officials can link policy initiatives. Other policies can constitute the conditions or space to manoeuvre for a new policy initiative.

Policies need to attract the necessary resources (legitimacy, political support, money and judicial enforcement) in order to survive. Therefore, actors participating in these processes try to make meaningful and effective connections with other policy processes or keep at a distance in order to safeguard their own policy ambitions. Within a policy field or process there are again two tendencies: one towards divergence (policy competition where each policy owner tries to defend the authenticity or identity of the proposal) and one towards convergence (policy integration where different policy proposals adopt elements of one another).

Policy decisions are not just a dynamic equilibrium within a policy process (consisting of a specific constellation of facts, frames and ambitions), but also form a dynamic equilibrium within a policy network between different policy processes (Van Buuren and Gerrits, 2008). This equilibrium depends on the dynamics of the policy context (the many other policy initiatives that are present within a policy field or spatial domain) and the way in which a policy process is embedded in this environment. Such equilibrium is temporal because of the fact that new policy processes can originate, and policies can change.

This chapter adapts the distinction that Mitleton-Kelly (2003) makes between *internal coevolution*, endogenous coevolution within a (sub)system that is conceptualized as coevolution between facts, frames and ambitions, and *external coevolution*, exogenous coevolution between (sub) systems that is conceptualized as the coevolution between different and mutually connected policy processes.

Policy actors make conscious steering efforts within policy processes, which can be seen as attempts to influence and stimulate the coevolution between tracks of facts, frames and ambitions and coevolving policy processes and thus their reciprocal selection. How difficult that can be and what consequences it can have is illustrated in the following case.



## 9.5 EMPIRICAL ILLUSTRATION: THE SPATIAL REALLOCATION OF GOUWE WIERICKE

This section illustrates the development of tracks within a specific policy process, the spatial reallocation of a polder in the western part of the Netherlands (first portion) and the way this policy process influences and is influenced by other—competing or supporting—policy processes.

### 9.5.1 Decision-making Between Diverging Tracks

The Gouwe Wiericke polder in the southwest of the Netherlands copes with complicated problems with regard to its water management. Gouwe Wiericke is a deep polder (6 metres below sea-level) and the soil is slowly dropping. The groundwater contains large amounts of chloride. Through salt seepage the water quality is substandard. The surrounding nature and recreation areas have severe problems because of the water quality. The polder delivers substandard water to its environment. Regional authorities became convinced about the necessity to realise several water retention areas (functional floodplains) in the polder for times of emergency and in doing so, wanted to solve the other water problems as well (For a more thorough and extensive study, see Van Buuren and Edelenbos, 2006).

Therefore, the Province of Southern Holland and the Water Board of the Rijnland district in 2001 began a policy process in order to develop a solution for the problems in this polder. Several *ambitions* were at stake. The different municipalities had their own ambitions in their jurisdiction. They wanted to safeguard their local interests (agriculture, liveability, etc.). The Water Board wanted to improve the water quality in its jurisdiction. The low levels of many meadows were causing problems for the farmers because of high surface water levels and the resulting problems of the accessibility and utilization of this land. Of course the farmers also wanted to continue their business as well as possible. Moreover, the Province of South-Holland wanted to develop more nature in agricultural areas. Therefore, the Province looked for possibilities, together with the Water Board, to enlarge water retention capacity, thus enabling it to cope with calamities (extreme rainfall, high river water levels). There were also citizens with recreational and infrastructural wishes as well as demands on liveability and safety.

Thus, it can be observed that the track of will-forming consists of many, strongly clashing ambitions. The ambitions of the Province and the Water Board received support from their mobilized track of *fact-finding*, a couple of technical reports (commissioned by the Province) and the strong *perceptions* of the Province and Water Board that only serious measures would be effective in this deteriorating polder. The reports showed that water retention would reduce the problems associated with the water quality significantly. Together with the dominant perception of politicians and officials



that the polder was as good as lost, and the ambitions to implement decisive measures in order to realise water retention, this formed the starting point for an intention agreement (March 2004) to start a planning process and to launch an Environmental Impact Assessment (EIA). In this EIA, the proposed alternative was defined as realising a permanent water retention capacity of 14 million cubic metres of water in the deepest parts of the polder in order to minimise seepage pressure and guarantee good water for the surrounding districts. That would mean the end of agricultural business in large parts of the polder.

However, this equilibrium was suddenly questioned. The inhabitants of the polder disputed this decision and the ambitions of the different governmental actors involved, based on their knowledge and interpretation of the polder as well as their own ambitions, which differed very much from the public proposals. In March 2004, the start of the EIA process and the proposed alternative were announced to the inhabitants of the area. During that meeting fierce resistance was made public. The farmers were angry at discovering the announcement of the end of their business. The authorities recognised the importance of this resistance and the underlying divergence in frames and ambitions. Therefore, they agreed on a proposal from Habi-forum (an independent knowledge network, financed by public and private organizations, promoting innovative projects and knowledge development on multiple land use and spatial quality) to set up an open trajectory of consensus formation, parallel to the EIA process. A Core Group was installed, which consisted of different inhabitants of the area, experts from the Province and the Water Board and a process manager. This allowed new ambitions, new frames and new (local) knowledge to enter the policy arena and to take part in the three tracks.

It was not easy for the Core Group to influence the existing process of *fact-finding* in the EIA. However, with the help of some joint meetings, interactions between the experts and the Group, members emerged. The independent process manager organized a couple of meetings of the Core Group, in which officials from the Province and the Water Board also participated, stimulating a process of *frame reflection*. As a result of their regular interaction, the independence of the process manager, the open atmosphere of these meetings and the honest exchange of opinions and interpretations frames were confronted with one another and actors developed more understanding for one another. The participants began to think in a more nuanced way about the water problems, the quality of nature in the polders and of the desirability of combined solutions in which different functions could be integrated. After an intensive process of interaction, the inhabitants were convinced of the necessity for measures to improve the water quality in the polder. The officials were more positive about the social and economic possibilities of the polder and more willing to consider the ambitions of the farmers to sustain their business. Joint field excursions, 'kitchen table talks' and also passionate debates were required to realise this frame convergence.

During this process, a change event in the track of *fact-finding* took place and gave it a welcome impetus. The initial results of the EIA showed that the proposed alternative (retention reservoirs) would cause more problems than it would solve. The research also showed that the existing problems were less severe than assumed by the governments at the start of the project. These outcomes were so apparent that they caused a new equilibrium: the regional authorities decided to skip the retention areas although their ambitions remained the same.

The Core Group members immediately decided to push forward their ambitions by pooling their knowledge and expertise into a new proposal, as an alternative to the original proposed solution studied in the EIA. This proposal consisted not only of a set of concrete ambitions (a mix of public ambitions with regard to water management and nature development and private ambitions with regard to agriculture, business opportunities and recreation), but also referred to a powerful image of the polders as an economically and socially vital community with a great sense of belonging to the area. To enhance its persuasiveness, new research was commissioned by the Core Group to demonstrate the added value of their proposal. Out of these coevolving tracks (see next section) in which the mobilized expertise helped to fine-tune the ambitions in the proposal and stimulate the further convergence of the frames of the participants in the Core Group, a balanced proposal with several creative ideas emerged. All functions (agriculture, recreation, water management) were served. To reduce seepage pressure, the farmers proposed raising the water level in the deepest parts of the polders. In combination with the integral reallocation of land in the polder, the farmers could combine nature development with their primary business. Contrary to the primary solution, large water retention areas, the problem of salt water was solved with small, specific measures that made it possible for the farmers to stay in the polder.

To get the necessary resources, this new equilibrium of facts, beliefs and ambitions had to be approved by the responsible governors of the Province and the Water Board. However, at the time when the governors had to decide about this proposal it became clear that they were not willing to agree on the proposal of the Core Group, because it did not fit into their frame of an agriculturally written-off polder and the ambitions were not far-reaching enough in their eyes. The governments only decided to implement some elements of the proposal, but it remains unclear what exactly was adopted and when it will be implemented. Two years later the farmers are still waiting to find out what will happen.

In hindsight, it can be concluded that during the development process of the proposal there was not enough interaction between the Core Group and the responsible governments to reach a process of frame integration between these two arenas. Until now, it remains uncertain what actually will be done with regard to the Core Group proposal. The Province and the Water Board continue to negotiate and quarrel about the question of who will have to pay for which part of the proposal.

### 9.5.2 Policy Competition in the Polder

The Core Group tried to make connections with other promising policy initiatives to enhance the chances of their proposal being approved. The external process manager who accompanied the Core Group proposed the introduction of “Green-Blue Services” into their proposal. The Green-Blue Services were presented as a new market-oriented policy instrument in water management. Farmers received financial compensation for the loss of the agricultural value when they allowed their land to be used to conserve water (Blue Services) or for landscape development (Green Services). These policy instruments fit into the (at that moment) dominant policy philosophy in the Netherlands in which a bottom-up governance approach with the active involvement of citizens and businesses to realise public goals is advocated. The persons who provided these services would be paid for this, and they could increase their financial compensation by improving the way in which they fulfilled the requested service.

As mentioned earlier, this proposal was criticized by the governors of the Water Board and the Province. The Water Board did not have any experience with Blue Services. They were afraid that it gave away authority to the farmers since water management is the core responsibility of the Water Board itself. Blue Services were considered to have only a minor impact, and such small-scale measures did not fit into their policy ambition to introduce large-scale, rational and efficient water management. To their knowledge the farmers’ plan was not manageable. In their search to reduce the amount of salt in the surface water, they aimed at measures with a large impact. This policy strategy of the Water Board countered the intentions of the proposal of the Core Group. The nature department of the Province was also not very eager to agree to the proposal of the Core Group. They preferred more large-scale measures to invest in nature development. They were not convinced of the quality of the nature projects proposed by the Core Group. They questioned the contribution of Green Services to the overall quality of nature in the polder.

Thus the proposal of the Core Group did not fit well into the policy environment. However, a development within the Province opened up a new possibility to make an interconnection and enlarge the chances of success for the proposal of Green-Blue Services. With the support of the Ministry of Agriculture, the Province worked on specific ‘area contracts’ with peat meadow areas. These areas all have similar problems with regard to subsiding farmland, bad water quality, decreasing possibilities for agriculture and so on. The Province tried to develop public-private management agreements with private actors to safeguard these areas from further deterioration. This development coincided with the process of the Core Group. Through the political deputy of South Holland who was responsible for both projects it was agreed that the possibilities to integrate the Green-Blue Services proposal—as a separate and autonomous part—into the final area contract for the peat meadow area of Gouwe Wiericke should be considered. This coevolution

between these two developments and the possibility of integrating them was an important success factor for the proposal of the Core Group. It guarantees the implementation of at least one part of the Core Group proposal in further policy rounds. Later on, however, it became an important source of delay and loss of content because the process of area contract encountered many problems and focused on more general problems in the wider environment.

In order to receive more financial support for the proposal (and thus to enhance its chances of success), the project manager from the Province (who was also participating in the Core Group) found a creative connection between the Green-Blue Services and the Wet Axes project (a large nature investment project in the green area of the western part of the Netherlands). This project was financed by the national government. In this way, he attempted to ensure enough financial resources to implement the proposal. Because of the delay of this Wet Axes project, this connection was ultimately less successful than the project leader had initially hoped for.

Still, much remains uncertain today. The political representatives of the Water Board, the Province and the municipality of Reeuwijk agreed in January 2006 on a rather broad and vague proposal and ordered a subsequent study in 2006. The municipality of Reeuwijk was the main driving force behind this decision, in view of the upcoming City Council elections (March 2006). They were afraid of a possible political shift that would be unfavourable to the proposal of the Core Group. A different political majority could be much more negative about the proposal than the current administration. As a result, the process was speeded up and a rather vague proposal was approved.

## **9.6 MANAGING PUBLIC POLICY PROCESSES: HANDLING COEVOLUTION**

Actors within a policy system attempt to influence the course of events in order to realise their goals. Policymakers, politicians and stakeholders attempt to make policy decisions that affect societal processes and the shaping of society. Therefore, actors within policy processes, especially actors who initiate a policy process, attempt to manage the way in which the different tracks of that process evolve and the way in which simultaneous policy processes evolve. There has to be some degree of convergence between facts, frames and ambitions in order to make coherent decisions, based on a robust factual underpinning, fitting in a broadly shared problem definition of stakeholders and integrating the most important ambitions of the actors involved, i.e. handling internal coevolution. When policy proposals are not adjusted to one another and develop in isolation from one another, effective integrated policy, i.e. handling external coevolution, is simply impossible. Virtually all parties can block a policy decision, so some degree of cooperation and mutual adjustment seems to be absolutely necessary.

As argued in the previous chapter, an important challenge for public management is to find and stimulate symbiotic forms of coevolution, both internal and external, in order to realise sound policy decisions. Therefore, it is necessary to bring a system into a situation in which converging and diverging powers are in balance. It is understood that actors' abilities are limited. Coevolution is to a large degree a spontaneous and self-organizing process. Nevertheless, it is possible to have some influence in this process. The previous chapter showed how actors can enhance their selection mechanisms in order to change their understanding of coevolutionary processes and to render the surprises a little less surprising. Here, it is argued that actors can exert an influence on the course and content of policies by influencing tracks and processes. Converging powers are indispensable to realise consensus and support. At the same time, diverging powers are required to prevent weak and meaningless compromises. Imbalance between these two powers would cause quality losses or a stagnation of the process.

## 9.7 INFLUENCING INTERNAL COEVOLUTION

The ambitions that actors express normally fit into their reality definitions (their frames). Hired experts try to generate facts that are useful for policymakers to underpin their ambitions. When facts deviate from perceptions but are too convincing to neglect or when (political) ambitions are too strong, stakeholders have to change their frame of mind in order to adapt them to changing circumstances. Also, divergence between tracks is often unintentional and spontaneous: experts have their own research methods, agendas and interests. Frames of actors are difficult to change and controversies can become larger when ambitions clash or facts are not accepted. Stated (political) ambitions can be hard to change, even when the facts are not in favour of them or when the general opinion is against them.

However, this does not mean that one cannot stimulate or influence symbiotic coevolution between these tracks. Several examples of this have been highlighted. The actors involved in the policy process will attempt to find the best fit between the tracks in order to utilize the coevolution between the tracks to the maximum. The way in which the two tracks coevolve, its management and the implications for the dynamics of the policy process will now be analyzed.

### 9.7.1 Coevolution Between Frames and Facts

To ensure that the facts of the original EIA received a good reception (in order to ensure their effect on the problem perception of the farmers), trust had to be developed by the members of the Core Group in the quality of the experts. Therefore, intensive interaction between them was organized.

The Core Group was involved in the choice of experts and the final review of the report. Because stakeholders could express their views and opinions, their frames were taken seriously in the fact-finding process, which resulted in more trust in the research results and subsequently in a slight adaptation of their frames to the newly generated insights. For example, the farmers became convinced of the problems with regard to the water quality and the necessity of rationalising water management. Joint field visits, discussion sessions about concept reports and presentations during the research process facilitated this. By organizing the fact-finding process in tight relation to the process of framing, a more nuanced problem definition by both the farmers and the officials emerged.

In the second phase, when the Core Group proposal was studied, a more gradual process of coevolution between facts and frames took place: new insights strengthened the conviction of the Core Group about the value of their proposal and added new insights to this. Based on these new insights, new data were produced which led again to a small adaptation of their frames. By comparing their own variant with a more 'green' and 'blue' variant, the strong elements of these controversial variants could be integrated into their own proposal.

However, much less was invested in organizing frame reflection by the responsible governors. The fact-finding was organized within the confines of the Core Group while the governors remained at a distance. Therefore coevolution between the two tracks on this level was not realised. The official frames remained unchanged. That explained why governors remained sceptical about the proposal of the Core Group.

### **9.7.2 Coevolution between Facts and Ambitions**

The search for a feasible and effective proposal of the Core Group can be seen as an intensive iterative process of fact-finding and visioning. After the initial draft drawn up by the farmers, the experts calculated the effects of this proposal and delivered the necessary information to fine-tune it, by comparing it with two other proposals (the green and blue variants). A powerful proposal (a combination of different effective measures) resulted from this. In this proposal, the weak points of the Core Group proposal were mitigated by adding the strong (and acceptable) elements of a more water-oriented and more nature-oriented planning proposal.

The beginning of the first phase, however, was characterized by much less interaction between experts and the people who made plans. Although the proposal to realise large retention areas was based on an analysis of the added value of such a measure, no study was conducted on its feasibility. Therefore, large discrepancies became manifest between public ambitions and scientific conclusions.

Regular interaction between experts, decision-makers and stakeholders is required to utilize and influence, as it were, the coevolution between facts and ambitions in which the ambitions steer the research questions and the research results serve to select and fine-tune the ambitions. Periods of isolation serve to guarantee the independence of the facts and the democratic (not technocratic) character of decision-making. Therefore, in the Core Group, interaction sessions with experts were alternated with brainstorm sessions between stakeholders and autonomous periods of report writing by the researchers.

In the first phase of the project, the ambitions of the governors were clear and fixed. The fact-finding in the EIA was only a calculation of their feasibility afterwards. Because of the limited interaction of the two tracks of fact-finding and visioning (only at the beginning of the fact-finding and afterwards when the facts were known) they developed rather jerkily and synergy was not realised.

### 9.7.3 Coevolution between Ambitions and Frames

To organize convergence between the ambitions and the frames of actors, it is important for processes of negotiation and deliberation to be intertwined. The goal of interaction is not only to achieve a broadly shared consensus about the definition of the problem, but also to achieve a workable solution and consensus about concrete measures.

In the first phase of the project, officials underestimated the importance of this coevolution. They presented their ambitions and did not reckon with the frames of the stakeholders in the polder. When their resistance became known, governors wanted to convince them of the necessity of realising the ambition of water retention. This one-sided approach generated much resistance. Only when the official ambitions were weakened did stakeholders obtain the opportunity to articulate their frames and to influence the ambitions of the governments.

Because the frames of politicians and officials were very negative about the polder, the Core Group had to invest in more positive images in order to realise their ambitions. Therefore, they underlined the economic and ecological potencies of the polder and the innovative character of their proposal (in terms of the interactive process and the result). Within the Core Group this coevolution was actually realised. The proposal contained many concrete ambitions and was based on a strong frame of the potencies of the polder. The process manager did a good job in presenting these alternative images to the governors, but his attempts did not have much success due to their strong and negative images. Whether his attempts were enough or not is questionable: the Core Group remained at a distance from the official channels of decision-making. The democratic anchorage of interactive settings is an often mentioned problem of interactive processes within the Netherlands (Edelenbos, 2005).



## 9.8 INFLUENCING EXTERNAL COEVOLUTION

Several management strategies have been seen to have been deployed in order to find the best position of the Core Group activities in the field of the different coevolving policy processes. The most important strategy was that of political coordination: the responsible political officials set the boundaries for the activities of the Core Group and thus guaranteed a fit between the Core Group proposal and other policies by defining the conditions for the content of the Core Group's definitive proposal. The project members from the different administrative bodies also brought their specific knowledge of other policy projects and attempted to adapt their strategies to fit into these projects. Thus, the most important strategy for achieving a best fit for their own project was to adjust it to existing proposals. This highlights a weakness of this project. There was not enough commitment from the responsible officials for the activities of the Core Group and thus the Core Group had to invest a lot in the adjustment of their proposal to competing and supporting proposals which ultimately resulted in a form of parasitic coevolution in which the proposal of the Core Group became the victim of more powerful policy processes.

At other moments, the Core Group attempted to convince the governments by investing in their own persuasiveness, in order to adjust existing policy plans so that their own proposal could be implemented. The proposal of the Green-Blue Services is an example of this strategy. The process manager had a broad perspective on the policy field and proposed several linkages with other rising policy ideas to increase the feasibility of the ambitions of the Core Group proposal. He also tried to get support from other officials and politicians for the proposal by explicating the strong points of the proposal in light of existing provincial policies (in the field of recreation, nature development and economic development). Some points of the proposal were adjusted after criticism from other governmental agencies. In reaction to criticism of the nature department of the Province, the proposal was adjusted by replacing the ideas of the Core Group to invest in specific nature spots with the ambition of the nature department of a dense strip of exclusive nature proposal. Another part of the proposal—the groundwater level management by farmers—was removed when the Water Board communicated that this idea was contrary to their policy.

It can now be concluded that all these attempts to realise symbiotic coevolution were not enough and did not have the desired effects. The proposal of the Core Group was not convincing enough for the deputy and the member of the Water Board administration. The core of the problem is the detachment of the Core Group from the official channels of decision-making and the detached stance of the governors involved. The Core Group, together with the participating officials, realised a broadly supported, feasible and apparently effective proposal. However, it was realised in a setting that was much too isolated from formal and powerful arenas of politicians and



governors. The linkages to other policy processes and philosophies were not convincing or worked out contrary to the intention of the Core Group.

## 9.9 CONCLUSION

This chapter has conceptualized policy processes as complex evolving systems, consisting of at least three dynamic tracks: a track in which facts are created, a track in which frames are produced and a track in which actors attempt to realise their ambitions or desired futures. These three tracks are to some extent closed and self-referential, but they also influence one another. Decisions can be seen as the result of the interconnection between these three separate tracks.

However, dynamics, scope and direction are not wholly explained by the coevolution of the different tracks. It is also necessary to take the interconnections with other policy processes into account, in order to explain the outcomes of a specific policy process. The proposal of the Core Group did not garner much support before it was connected with other policy initiatives. Political support was important for the implementation of the Blue-Green Services proposal. This support was obtained in a more indirect rather than direct manner: by connecting its own proposal to other, more appealing, proposals the Core Group gained more political support.

It can be concluded that handling coevolution means that two seemingly contradictory types of strategies are combined (Van Buuren, 2006). The first type of strategy is oriented towards the autonomy and freedom of the constituting parts of a complex system (in this case, the facts, frames and ambitions within a policy process; or the different policy processes within a policy field). These strategies attempt to maximise the power and quality of these parts in order to survive in the struggle for attention in the bustle of policy processes, and therefore focus on the evolution of the separate parts. However, too much emphasis on this strategy can result in fragmentation and a lack of cohesiveness between the different tracks, so that integrative solutions are not realised. The strong focus of the Province on water retention as an overarching ambition closed its eyes to the frames of the stakeholders in the polder and the possibility that the facts could forestall the realisation of water retention.

Therefore, the second type of strategy is focused on integration between the constituting parts of a complex system. They attempt to enhance the integration between the different parts and try to realise cohesive results. These strategies are oriented towards mutual adaptation and towards weakening the struggle for the dominance of specific facts, frames and ambitions over other facts, frames and ambitions, and of different policy processes over others within one policy domain. In the second phase of the project, this mutual adaptation was realised due to the deliberate management interventions of the process manager.

However, after analyzing this case, it can be concluded that there is a third relevant level of coevolution. This is the coevolution of arenas, or institutional places for decision-making (Baumgartner and Jones, 1993). When this coevolution is omitted, decision-making processes become fragmented within distinct arenas. In the Core Group, administrative and societal arenas were brought together, but the political arena remained at a distance. This type of coevolution is also served by the deliberate combination of isolation and integration (Van Buuren and Loorbach, 2009). In isolation a Core Group of a comparable arena can realise innovative proposals, out-of-the-box thinking and creative breakthroughs. However, when there is no integration, the agreed-upon proposal lacks the connection with formal arenas and is then not adopted.

All in all, it can be said that for effective policy-making to occur, the actors involved must strive for organizing *bounded instability* (Kiel, 1994; Merry, 1999). In the terms used in Chapter 1: to bring the process system into a dynamic system state. In such a situation, the ideal conditions for creativity and innovation, spontaneous emergence and self-organization are all present (Haynes, 2003; Kiel, 1994). As Merry (1999: 275) says:

Poised at the edge of chaos, the organisation can find the mix of confirmation and novelty that allows it to be a learning system that is able to continually self-organize and thus renew itself. It is able to have enough stability to maintain its identity, while at the same time it has enough creativity, novelty, and change-ability to be sustainable in the rugged, networked landscapes it inhabits. It has found the balance between chaos and order, novelty and confirmation, change and continuity, autonomy and interdependence.

From the literature on innovation we know that the power of creativity lies in combining both cooperative and competitive forces (Nooteboom, 2000; Gilsing, 2003). In terms of our conceptual framework, bounded instability must be organized within and between policy processes and attempts must be made to combine converging and diverging powers in our search for collective decisions. This challenge is analyzed in more detail in the next two chapters.

# 10 Managing Complex Process Systems

## Surviving at the Edge of Chaos

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### 10.1 INTRODUCTION: THE MANAGEMENT PERSPECTIVE ON COMPLEXITY

The preceding chapters have discussed how non-linear dynamics and complexity occur in the practice of public administration. Through the use of concepts of self-organization, non-linear dynamics and coevolution, a better understanding of the complex character of public decision-making has been reached. It has been shown that dynamics originate from change events, the self-steering ability of subsystems, including the subsystem that considers itself to be the steering entity (mostly governments), and feedback between coevolving systems. Public administration consists of many self-organizing subsystems. People attempt to give meaning to these subsystems and oftentimes create new subsystems to cope with complexity. These self-organizing subsystems sometimes coevolve with other subsystems, but at other times and in other circumstances they evolve in a more closed and autopoietic way, which also generates non-linear dynamics (see Chapter 8).

The next question then becomes: how do public managers (attempt to) cope with the observed (non-linear) dynamics and complexity in public projects? This chapter attempts to provide insight into how managers cope with complex systems in their daily professional lives. Managing complex systems is not an easy task, because it is difficult to grasp or even understand the full complexity of many projects. Public managers try to survive this complexity and try to give meaning and direction to it. Some argue that social complex systems can be influenced, because they significantly differ from organisms or natural systems. Since there is an element of choice for the agents about which rules to enact and which to discard (Macintosh and Maclean, 1999), it is also possible to influence that choice moment.

Complex systems are approached in this chapter as *complex interaction processes between actors involved in developing and implementing spatial projects*. This is done by looking at ways the domain of public

administration can manage complexity and attempting to connect these ideas to complexity theory. It is especially important to discover how contrasting management styles can be applied in different system states (see Chapter 1) in order to bring the system to the optimal state for generating effective and legitimate action. This conceptual merge is confronted through empirical material on managing complex spatial projects in the Netherlands and the UK. The first section explores ideas on management in complexity theory.

## 10.2 CHARACTERISTICS OF MANAGERIAL STRATEGIES IN COMPLEX SYSTEMS

The assumptions of complexity theory certainly pose a challenge to managers. They have to be able to observe, understand and respond to the sometimes erratic developments of the system as a whole and address the behaviour of individual agents.

### 10.2.1 Management in Complex Systems

Although the literature that focuses on the characteristics of managerial behaviour from the perspective of complex systems is limited when it comes to empirical analysis, one thing that stands out is that managers must be flexible and resilient. Managers have to take the complex characteristics and non-linear dynamics of systems into account (Griffin, 1998; Stacey, 2003; Stacey et al., 2000).

The existing literature on complex systems indicates how managerial strategies have to be organized and implemented in order to cope with complexity (Griffin et al., 1998; Senge, 1990; Stacey, 2003; Stacey et al., 2000):

- *Flexible*; if systems are characterized by complex dynamics, managerial strategies must be flexible so that they are able to cope with a myriad of different interactions, actors and unexpected consequences and effects.
- *Adaptive*; if complex systems are characterized by emergent properties, then managerial strategies have to be adaptive in order to fit the changing properties. In that sense, much emphasis is placed on learning capacities of systems and managers.
- *Specific*; if agents in social systems are adaptive and thus themselves complex, managerial strategies have to address (local) actor dynamics in order to be able to influence dynamic patterns that arise out of the interactions of separate agents.

The literature on complex systems that focuses on management characterizes managerial activities as sense-making, recursive thinking (Tsoukas

and Hatch, 2001) and learning (Stacey, 2003), and takes into account “the essential local nature of human interaction” (Stacey, 2003: 40). These insights fit into some of the ideas from public management theory, which also stress the emergent, context-specific and unpredictable character of public administration (cf. Mintzberg and Quinn, 1998; see also Chapter 2 of this book).

Based on the assumption that management in complex systems is flexible, adaptive and specific, it seems plausible to assume that managers in complex systems develop and apply all kinds of intermingled strategies in order to survive the complex nature of processes and projects. The research on managerial styles and strategies in complex spatial and infrastructure projects in the Netherlands presented in this chapter, conducted during 2004–2006, confirms this assumption (Klijn et al., 2006).

In this research project, 32 managers from 18 prestigious Dutch spatial and infrastructure projects were interviewed. Several managerial pairs of choices were presented to them in the questionnaire. The results showed that managers swing between the broad and limited participation of stakeholders. They seek a balance between realising goals that have been formulated early in the project and searching for new goals. They demonstrate flexibility but then shift towards being more firm and consistent at different times. If these insights from empirical research are applied to complexity theory, it can be assumed that managers vary their *boundary judgments*: they sometimes define their system as smaller (for example, by limiting the project scope), and sometimes as larger, when they try to seek combinations (and define their project as a regional development in which space for other spatial functions such as house building and green development exists). This behaviour is also observed in the cases presented in Chapter 8. Thus, it is clear that managers develop and apply a *dual management strategy*: one focusing on control and order, and another focusing on letting go and dynamics. This distinction will be addressed again in Section 10.3.

### 10.2.2 The Management and Dynamics of Systems

At second glance, this duality is not so surprising when considering the characteristics of complex systems from a complexity theory point of view. Systems are not only highly dynamic, but also temporarily in a specific system state (see Chapter 1). This means that systems find themselves in a state between inertia and chaos. This is not a stable equilibrium but a punctuated equilibrium in which negative and positive feedback mechanisms hold the system at one point temporarily (MacIntosh and Maclean, 1999; Mitleton-Kelly, 2003). Because of this, systems can easily change as a result of small perpetuations.

The question then arises as to how stable and unstable systems can be recognised, as that would be necessary if managers are assumed to make

boundary judgments in order to cope with system complexity. The various states of systems that are distinguished in Chapter 1 of this book are now discussed. These four states are described in the following ways, to assist in distinguishing the four states in the case studies:

1. **Stable system:** interaction processes between actors from within the system or subsystems run smoothly. No demanding conflicts or other disturbances occur, and as a result the intended results are realised.
2. **Inert system:** interaction processes between actors from within the system or subsystems are deadlocked. The extent of interaction has decreased and even stopped, or interaction takes place in the form of struggle, conflict and fight. Results and progress are not realised.
3. **Dynamic system:** a lot of interaction processes between actors from within the system and other systems take place. There is 'ongoing interaction' between actors, and interaction takes place intensively and harmoniously. These dense and widespread interaction patterns lead to unforeseen, surprising and innovative results.
4. **Chaotic system:** here also a lot of interaction processes take place, but in an undirected and disconnected way. They take place in a highly uncoordinated manner. Interaction processes are not productive but take place fragmentally without taking the whole into account. The consequences are that results and progress are not consolidated but rather evaporate.

Many authors also argue that the systems' state of dynamics which is at the edge of chaos (Pascale, 1999) is the most fruitful for systems to be in since stability does not generate innovation and chaos does not produce results (Stacey, 1995; Merry, 1999; Teisman, 2005). In the cases presented here, we attempt to determine the state a system is in according to the aforementioned features of the four different system states. The management strategies that are employed in different system states are also observed.

### **10.3 PROCESS AND PROJECT MANAGEMENT AS TWO SIDES OF THE SAME STORY**

This chapter is interested in how managers cope with the complex character of projects. There is a departure from the assumption of complexity theory that managers attempt to influence the state in which their process system is in, in order to realise their project ambitions. In doing so, they must balance between the extremes of inertia and chaos. This leads to the possibility that managers sometimes stress order (try to control dynamics),

and sometimes emphasize chaos (give room to dynamics). Our earlier research (Klijn et al., 2006) found the pattern that managers attempt to manage the complexity of projects by *combining* management strategies, by at one time *ignoring and diminishing* complexity and at another time *accepting and allowing* complexity. This dual strategy fits the distinction made in Dutch management literature between project and process management well (De Bruijn et al., 1998, 2004; Edelenbos, 2000; Teisman, 2001; Koppenjan and Klijn, 2004). The concept of project management is also used in international literature (Meredith and Mantel, 2000; Mantel, 2005). Process management is a particularly Dutch phrase; in international literature other words are used with almost similar meaning, such as mediation (Süsskind and Cruikshank, 1987) or network management (Gage and Mandell, 1990; Mandell, 2001). Process (re)design and management is used in American literature differently from this chapter, in the sense that managers attempt to control and direct processes (Hammer and Champy, 1993). This chapter uses it to mean the opposite of this! It is, however, in the Dutch view that project management does fit into this management perspective.

The main differences between project and process management are summarized in Table 10.1 (see also: Gage and Mandell, 1990; Kickert et al., 1997; Mandell, 2001; Agranoff and McGuire, 2003; Meredith and Mantel, 2000; Mantel, 2005; De Bruijn et al., 1998; Süsskind and Cruikshank, 1987):

*Table 10.1* Overview of Process and Project Management

<i>Dimension</i>	<i>Project management</i>	<i>Process management</i>
Main focus	A well-thought-out substantive solution to the problem.	The involvement of stakeholders and their interests.
Dealing with dynamics	Thorough decisiveness and control: dynamics are approached as dysfunctional because they lead away from the initial designed solution.	Through resilience, responsiveness and being open to other options: dynamics around a project must be taken into account and can lead to changes in the initial solution.
Self-organization	Autopoietic self-organization: changing circumstances must not affect the planned course of action.	Dissipative self-organization: the initiative must be and remain open and attractive for actors.
Coevolution	Almost separately from the environment. A singular process system is seen as desirable to stay in control.	In interaction with the environment. A composite process system is seen as necessary to realise consensus.
Most important problems	Acceptance of results.	Time-consuming.

When these two management styles are combined with the main concepts used in this book, it can be argued that the two strategies can be seen as two different types of boundary judgments managers use to demarcate subsystems in their project. When project management is adopted, the project is broken up into different subsystems that are demarcated explicitly. Project management can be seen as autopoietic self-organization of different subsystems that develop relatively independently. In other words, project management is primarily concerned with controlling the project subsystems internally and is less concerned with continual interaction and coevolution with other subsystems and the external environment.

Upon reflection, a process management strategy demarcates the project subsystems less explicitly: they are approached as loosely coupled elements within the total project. The subsystems are characterized by dissipative self-organization; they remain open and responsive to changes in other subsystems (context). The subsystems coevolve in a more or less open and interdependent way. A change in one subsystem affects and is allowed to affect the other subsystems, and then is influenced again by these changes in the affected subsystems. Coevolution can also take place between autopoietic self-organizing (sub)systems, but is often not productive (see Chapter 8).

Thus, there is interest in how managers develop and apply their management strategy to complex projects, seen as different subsystems of complex interaction processes. The next section introduces three cases, and Section 10.5 will analyze these three cases in more detail.

## 10.4 THE MANAGEMENT OF COMPLEXITY IN THREE CASE STUDIES

### 10.4.1 Key Information on the Three Cases

This section presents an overview of key information on the three cases—Sijtwege, Grift and Regenco (see Table 10.2).

### 10.4.2 Case Sijtwege: Description and Analysis

#### *Case Description*

##### *Round 1 (1938 to 1995): The Beginning of the Battle*

The Sijtwege project has a long history. As long ago as 1938, plans had been drawn up for the construction of a connecting highway between two other highways in The Hague Region. The project is a rather specific one with a long history of inter-administrative dispute between the municipality



Table 10.2 Key Information on the Three Cases

	<i>Sijtende</i>	<i>Grift</i>	<i>Regenco</i>
Country	Netherlands: nearby city of The Hague	Netherlands: city of Apeldoorn	United Kingdom: Birmingham region
Problem	Road realisation, hinder and nuisance	Groundwater levels, extra water with heavy rains, water pollution	Deterioration of the area (employment, housing, education)
Solution	Multifunctional development: tunnel for infrastructure, house building, green and office building	Bringing back water streams, disconnecting sewer from rainwater, improving quality of water, enhancing environmental quality	Large-scale regeneration: housing industrial areas, etc.
Time-frame	1938–2006	1992–2020	1999–2020
Main actors in the system	Municipality Voorburg, department of Traffic (Rijkswaterstaat), private consortium	Municipality Apeldoorn, water board and water company	Urban Regeneration Company Regenco, municipality
Process development (decision rounds)	Governmental fight 1938–1995, breakthrough in 1996, development of plan 1996–1999, implementation of plan 1999–2006	1. 1992–1999: separated project 2. 1999–2002: looking for coordination 3. 2003–present: working on implementation rules	The creation of Regenco: 1999–2003; Development of plan: 2003–2004; Implementation: 2004–present
Systems and its characteristics	The first round can be coined as inertia. Interaction is deadlocked. The second round is first chaotic (a third actor gets interaction going leading to many processes of cooperation and searching for innovative results) and then dynamic finding common ground and structured consultation. The third round can be characterized as a stable system state. Interaction stabilizes but decreases at the same time. Actors lose contact with one another; the plan loses variety and innovative power.	In the first round the system seems stable. Only a few mutual interaction or conflicts occur, and the proven domain rules. Second round: chaotic system, many interactions and some progress (on projects) but also a fair amount of conflict and disruption; cooperation is difficult because of changing interaction rules. Third round: dynamic system with higher interactions between actors, more involved actors and accepted interaction rules, system produces valued outcomes for the actors.	Regenco was created as an answer to an inert system. There are many initiatives, projects and partnerships, but no productive interaction and even conflict. In the second round the system state transforms to a dynamic equilibrium. Regenco develops plans at first that are more focused on making progress, later more focused on the involvement of stakeholders. The third round mostly displays the characteristics of a dynamic system's state.

of Voorburg, which put up stiff resistance against a planning intervention and the Ministry of Transport (by means of Rijkswaterstaat), which championed a ground-level variant. This conflict lasted almost 60 years.

*Round 2 (1995 to 1999): The Private Consortium as Peacemakers*

Around 1995, the intervention of a 'neutral' third party, the private consortium Sijtwende BV, represented a breakthrough in this public–public controversy. Sijtwende BV consists of three companies: Volker Wessels Real Estate, Bohemen BV and Van Hattum and Blankevoort. A public–private partnership emerged in which public and private parties combined their strengths.

Sijtwende BV proved to be a manager capable of achieving reconciliation and able to break through the barriers between public organizations. At the same time, it developed a creative and innovative multifunctional land use plan. The private consortium Sijtwende BV then put forward its hollow dyke solution, the Sijtwende plan, which safeguarded the interests of the Ministry of Transport as well as those of Voorburg. The hollow dyke, which rises 6 metres above ground level, is both soundproof and landscaped.

The private consortium, Sijtwende BV, took an active steering role in the process. They brought public organizations and leaders together, and facilitated the collaboration between the public and private parties. Because they were not linked to the turbulent history of the project, they were able to take a conciliatory stance in their interactions with others.

Sijtwende BV created an alliance between parties that were enemies for years. The manager had much relationship orientation and a focus on communication and mutual interaction, by bringing parties together and intensifying interactions. The manager spent much time breaking open the closed bastions of Rijkswaterstaat and Voorburg.

The initial plan in 1995 was adjusted to the specific interests and wishes of Rijkswaterstaat and Voorburg. Sijtwende BV showed flexibility in their role as broker and an organization with a market interest in realising constructions. Sijtwende BV often attempted to expand the scope by making connections between substantive elements within the project resulting in the multiple land use solution that not only produced the idea of a new road, but also ideas for creating new office space and the building of a recreational area, green space and leisure facilities.

*Round 3 (1999 to 2007): Project Implementation*

Implementation of the plan began in 1999. First the tunnel was completed in 2003, and after that the projects on house building, developing a public green area and office buildings were begun. These parts were finalized around 2006.

During the implementation phase, Sijtwende BV (as the developer) distanced itself more and more from the role of process facilitator. Van Hat-tum and Blankevoort (as part of Sijtwende BV) became more active as the road's construction supervisor.

To the extent that the implementation of the Sijtwende plan progressed (after 1999), the relationships took on a more bilateral character: diverging issues were discussed and solved within various bilateral relationships. The actors gradually began to feel exclusively responsible for that part of the Sijtwende project in which they were most involved in. For instance, Rijkswaterstaat felt most responsible for the road and less so for the housing in the overall plan. The primary interests of Voorburg lay in housing and the layout of the public space. All partners narrowed their scope to the single task they were held responsible for. In some areas, parties refused to participate on the basis of joint responsibility for the overall plural plan.

### *Case Analysis*

The project Sijtwende can roughly be divided into three stages with different system states. First the deadlock situation and a system state of inertia can be identified (from 1938 to 1995) between the municipalities of Voorburg and Rijkswaterstaat. This situation shows that the project manager from Rijkswaterstaat had a pointed focus on a specific solution for the spatial problem for the ring road for The Hague with an aboveground solution for the piece of road in the municipality of Voorburg. Voorburg wanted an underground or sheltered implementation of the road. These strong boundary judgments on the desired implementation released fierce resistance from the municipality of Voorburg. The stalemate lasted almost 60 years. The representatives from Voorburg and Rijkswaterstaat developed their own stand-alone strategies and rejected each form of co-production. As one respondent said: "both parties had turned their back to each other and were not able and prepared to talk to each other outside the juridical arena" (respondent from Sijtwende BV, 2001). Both parties displayed autopoietic behaviour: they set their own course and were not responsive to the arguments maintained by both parties.

The arrival of a third neutral party, private consortium Sijtwende BV, resulted in a breakthrough and its entrance and strategies brought the system for a moment into a chaotic system state. New interaction processes between Voorburg, Rijkswaterstaat and Sijtwende BV emerged, and appealing new plans were integrated into the system. This system's state can be characterized as highly creative, where new processes and new substance came into play.

Voorburg and Rijkswaterstaat were surprised by this intervention in the process. They were bewildered by the new situation, and Rijkswaterstaat in particular did not know at first how to approach and appreciate this new situation. Voorburg immediately saw opportunities to connect their

ideas to the initial plan of Sijtwende BV. Rijkswaterstaat, however, was more hesitant, because this organization mistrusted Voorburg and saw this alliance with Sijtwende BV as a new attempt to frustrate the plans of Rijkswaterstaat. “We thought that this action of Voorburg was one of their next tricks to oppose the road, and delay the process once again” (manager of Rijkswaterstaat, 2001). Later on Rijkswaterstaat was happy with the breakthrough and became a supporter of the hollow dyke solution.

Sijtwende BV as a manager understood that it had to calm down this chaotic state of systems to a state of dynamics. They structured and coordinated interaction processes between the main actors. Sijtwende BV invested much in building a workable relationship between Voorburg and Rijkswaterstaat. Sijtwende BV succeeded in breaking down barriers in order to decrease the autopoietic behaviour of both parties, and managed to give life and meaning to cooperation. They used project management (content-oriented) as well as process management (relation-oriented). Sijtwende BV succeeded in expanding the project scope and in making connections between actors and the different substantive aspects of the project. This resulted in developing a multiple land plan, in which not only a new road came up, but also ideas for creating new office space and the building of a recreational area, green space and leisure facilities. Slowly, the three parties further developed the plan in such a way that suited their private interests. Thus, Sijtwende BV organized calmness after a hectic period of emerging new ideas, a new actor and new interaction processes in the second round, and at the same time initiated various interaction processes to (further) develop an appealing plan. “All partners in the cooperation were making genuine effort to make this cooperation work. All the partners were like-minded actors. This increased faith in each other; it was the fuel for trust” (respondent from Voorburg, 2001).

A third round then began in which a system state emerged that can be characterized by a renewed desire for boundary judgments and scoping. “We were in a total new phase of the project, in which more attention was paid for actual realisation. Making bilateral agreements seem most logic” (respondent from Rijkswaterstaat, 2003). Not just Rijkswaterstaat and Voorburg but also Sijtwende BV felt the need for clear relationships through the definition of strict boundaries between tasks and responsibilities. Rijkswaterstaat was held responsible for building and maintaining the road, Voorburg for a high-quality housing estate and Sijtwende BV for the implementation of the overall plan (road, housing and offices). The financing of the Sijtwende plan was shared by the parties involved in accordance with their responsibilities.

This was the beginning of the rebirth of the autopoietic self-organization of the individual actors. Slowly the orientation on cooperation decreased. There was little communication and interaction between the parties, especially with respect to the development of the overall Sijtwende plan. Parties stressed their own interests, and gave meaning to the plan development in their own exclusive and demarcated responsibilities.

It can be seen that Sijtwende BV placed less emphasis on relationship management and become more focused on the substance and profit to be gained from this project. Van Hattum and Blankevoort (as part of Sijtwende BV) became more active in the role of the road's construction supervisor. The other partners found the role of VHB debatable. Their role in the implementation phase was seen as that of a traditional building contractor and not of a cooperative partner. "It was oftentimes not clear with whom we were speaking: with VHB as a subcontractor or with VHB as a part of the cooperation" (respondent from Rijkswaterstaat, 2003).

Sijtwende BV, once a visible and appreciated actor became in the eyes of the other partners an ambiguous network of subcontractors. "Looking back, it was probably better to keep a more overview of the project and process. We might have prevented the occurrence of some issues" (respondent from Sijtwende BV, 2003). Emphasis began to be placed more on project realisation and less on process management. Boundary judgments became tighter; parties became more introverted, and went for their own particular interests. "We feel sole responsibility for the road and the implementation of the tunnel. Voorburg and Sijtwende BV must take care of other aspect of the project" (respondent from Rijkswaterstaat, 2001). No one kept an explicit eye on the total project in which multifunctional land use was the prime orientation. Plans were split up into sub-projects that had to be carried out separately. The parties concentrated on a particular portion of the plan at the expense of the overall plan. This is one explanation for the failure of the Sijtwende plan to develop a stronger multiple land use character during the implementation.

### 10.4.3 Case Grift Apeldoorn: Description and Analysis

#### *Case Description*

##### *Round 1: Seeking Integration in Separated Projects*

In the 1990s, both the municipality of Apeldoorn and the water board Veluwe (which is responsible for water management) identified the need for a vision and policy on the various streams and brooks around the city, which included the Grift. The pressures that drove both organizations to this were a result of several experiences:

- In planning for new housing projects, streams and springs were regularly under discussion or played a role in the design of plans.
- An increase in the illegal use of flood-banks had been observed in areas where they bordered on private gardens.
- An increase in problems due to a rise in groundwater levels had been observed in different neighbourhoods.

The ambition was to realise a more coordinated and integrated water policy for the aforementioned developments and problems. This resulted in the starting of the restoration of streams by the water board and a discussion of some initial ideas with the municipality for more integrated water management.

### *Round 2: Looking for Coordination between the Grift and the Hofstraat*

The first time that a collaborative attempt to restore the Grift was explored was actually the first time that the municipality and water board worked together. It resulted in a study in 1999 entitled ‘The Grift: Now or never!’ where possibilities and opportunities for restoring the stream Grift were studied. The Hofstraat was actually the first joint project between the water board and the municipality as a result of the document on the Grift in 1999.

Various challenges emerged during the decision-making process about the Hofstraat. In terms of content, the biggest problem was in finding a way to fit all the spatial functions into the available space. The design assignment was complicated because not only did the water have to be brought back, but there were also ambitions to create a car-free zone, to alter the placement of bus stops and others, including creating an architectural surrounding of good enough quality. One significant problem that also manifested in the discussion about the broader water plan (see next round) was that the parties involved had difficulty cooperating because of domain conflicts. Integral water management means that actors have to work together, but the water board in particular considered bringing the floods that the municipality had taken over during the Hofstraat project back under their jurisdiction. There were also disagreements about the financial contributions the two actors should make. The water board contributed only a limited amount of money to the Hofstraat project while the municipality made very large investments.

### *Round 3: Working on Implementation (2003 onwards)*

During the period after the completion of the Hofstraat, actors worked on a general policy document on water management that came out in 2005—the water plan—in which all the ambitions were laid out (improving the sewer system, disconnecting rainwater from the sewer system, restoring the floods to secure the disposition of rainwater, improving the quality of the water in the area, etc.). After fairly intensive interactions, the actors (the municipality, water board and Vitens, a water company) agreed on a decision-making structure.

First, actors came to an agreement on the general idea of the projects and the policy aims (based on the water plan document). The policy conditions (such as in the water plan) were designed and worked out by a

policy team (composed of officials from the municipality and water board), which then passed the initiative to a project team that worked out concrete projects (like the Hofstraat or other projects). Second, the projects were worked out in more detail by a project team. This group (the water board and representatives of various sections of the municipality) worked out the ideas and took care of the design process. Third, the municipality and the water board agreed on joint project leadership for all projects. Projects that included urban restructuring were managed by the municipality and projects that had a strong rural character were managed by the water board. Fourth, the involvement of other actors (mainly inhabitants and environmental groups but also, especially for the urban regeneration projects, economic actors such as shop-holders in the Hofstraat project) was organized. These actors were involved both in the drafting of the policy proposals and in the project process by special boards (called sounding-boards) in which various actors were invited.

The overall decision-making proceeded according to a pattern where, on the one hand, the general policy ideas were drafted and redrafted within a policy team and, on the other hand, projects were prepared and implemented by the project team. Other actors were involved through platforms that could respond to early drafts of the project proposals.

### *Case Analysis*

In observing the interactions in the various rounds, it can be seen that the case began with a relatively stable system of interactions which also showed clear characteristics of inertia. The two main actors (the municipality and water board) had only limited mutual interactions and minded their own business for the most part. They developed their own plans and respected the classical domain rules. Other stakeholders only incidentally participated in the interactions. The overall amount of interaction in the system was low while each of the agents showed fairly autopoietic behaviour. In terms of integrated water policy, which was already the aim in the first round, the results were not very promising. In that sense, the system showed some signs of inertia. In this first round there was actually only project management. Actors were mainly oriented to managing their own projects and exploiting their own practices. It is a type of management that also fit the fairly autopoietic way in which the agents within the system were reacting and organized.

In the second round, the dynamics can be seen to have increased considerably and led to a state of chaos. Not only were there more intensive interactions between the two main actors, but other actors were joining in as well. Various stakeholders were activated by means of panel and focus groups and the water company (Vitens) was included in the interactions. This enhanced the interconnectivity between the subsystems (various projects) and the number of interactions between the main actors. However,



more conflicts also occurred, especially between the municipality and the water board with regard to domains and financial contributions. This led to difficulties in achieving results. The relatively stable (almost inert) state of the system in the earlier period had been disrupted and the system was now in a more chaotic state. In the words of one of the participants:

During the execution of the projects Grift and the Hofstraat, relations between water board and municipality were tense. The water board traditionally did the restoration of streams and felt threatened when the municipality started with the streams in the city. That caused a lot of discussion almost real quarrel. Both parties were in the project group [of the Hofstraat project, authors] but in governance terms there certainly was no peace.

The stability of the first period was sustained by the domain rules (boundary judgment) between the main actors, but these rules were now put under pressure, which enhanced abundant dynamics in the system. Although some results were produced in this period (finishing of projects), truly integrated water management and cooperation between actors was not really achieved.

Within this chaotic state of the system, the traditional project management was partially substituted by various activities of process management where actors attempted to cope with the growing complexity of the system through structuring by tightly defined boundary judgments. On the one hand, this was necessary for the system to cope with the larger number of actors and the growing amount of conflict. It was also required, however, because tensions arose over well-established interaction rules. Thus, managerial activities such as conflict resolution, the activation of and connections made with other stakeholders (like inhabitants, economic actors, etc.) to both separate projects (like the Hofstraat) and the drafting of the general policy plan could now be observed. There was a strong ambition, especially among people from the municipality, to connect the various projects to one another and to achieve program management.

It was not until the two main actors designed new interaction rules (on the division of costs through the 33–66 per cent agreement and on the joint project leadership, for instance) in the third round that the system stabilized, and went into a state of dynamics. This time the interactions between all involved actors were much higher as compared to the first round. The main actors now tried to keep the system stable through a mixture of process and project management. They attempted to plan the projects along a program and used process management to cope with the ongoing uncertainties and alter the content if necessary. They used project management to deal with the individual projects when these were developed well enough. The interface between program and projects was achieved by linking pin positions of individuals who were part of both management teams or through interactions and coordination between the two teams.



A change in boundary judgments of the main actors can be observed, where they defined their system as very limited (their own organization) in the first round and then altered it to become fairly wide in the third round. This is highlighted in the comments made by one of the respondents about the projects and the policy:

At this moment [2006, the authors] we are working to get a picture of the entire project over 10 years time, and see what we are going to do. At the same time we are occupied with concrete projects, which are a huge list together. But we have also many issues that are important around all these projects who are only arrange in abstract terms. The moment you enter in specific projects on these topics, like how do we interact with project developers you have to arrange a lot.

Along with the change in boundary judgments, agents came to adjust their behaviour, which created a larger degree of coevolution between the sub-systems (the individual agents). The process management was aimed at the general policy initiative and at keeping the various actors involved. The project management was used more for independent separate projects that had been agreed upon. The interface between program and projects was achieved by linking pin positions of individuals who were part of both management teams or through interactions and coordination between the two teams.

#### 10.4.4 URC Regenco, Birmingham: Description and Analysis

##### *Case Description*

##### *Round 1 (1999–2003): Towards the Creation of Regenco*

The 1999 Urban Task Force Report by Lord Rogers, entitled ‘Towards an urban renaissance’, is the basis of the creation of the Urban Regeneration Company (URC) Regenco in Sandwell, a municipality that lies northwest of Birmingham. The quality of urban areas decreased rapidly because of a lack of attention paid towards their physical, social and economic aspects. As a result, large-scale regeneration was required in order to alter these unwelcome developments. One of the recommendations of the report was to create ‘arms length’ organizations—organizations that operate at a distance from government and have realisation powers—to realise this regeneration. The British government accepted these recommendations and supported the creation of three pilot URCS. In 1999 and 2000, URCS were created in Liverpool, East Manchester and Sheffield.

In Sandwell, which used to be a strong industrial area situated in the West-Midlands, the aforementioned problems became urgent as well. Developments in this area had been almost absent for the last 20 years

or so. The problems, including loss of employment, bad housing conditions, a lack of private investments and an inadequate education system, had become worse and worse over the last few years.

The initiative to create Regenco began at the level of local government. They felt the need for action and saw a URC as an opportunity for improvement. In 2002, Sandwell MBC created a joint Task Group with English Partnerships (EP), the national agency for regeneration, and Advantage West Midlands (AWM), the regional development corporation. Together they applied in August 2002 for the URC status with a business plan and business case. The Sandwell Urban Regeneration Company (Revised) Prospectus and Business Plan seemed convincing enough for the central government to decide to fund it and on 8 April 2003, Regenco was created.

### *Round 2 (2003–2004): The Development of a Master Plan*

After the creation of Regenco, its first task was to design and arrange the organization. The Regenco organization consisted of a project bureau and a board. The project bureau employed nine people and was financed by the three partner organizations in the URC. The Board consisted of 10 members, among whom were representatives of both the public and private sectors. Project developers were not represented on the board; they became involved when projects were implemented.

Besides the initiation of the organization, Regenco developed a regeneration framework for the entire area. Regenco organized and managed an interactive process in which Regenco, EP, AWM and the Sandwell Metropolitan Borough Council (MBC) were the most closely involved stakeholders. Other stakeholders (such as housing associations, citizens, etc.) could also contribute and participate in the process. At the end of 2004, the regeneration framework was completed and approved by the Sandwell MBC.

### *Round 3 (2004–present): Detailed Planning and Realisation*

After the master plan was approved by Sandwell MBC, detailed plan development for different parts of the project could begin. Regenco coordinated these processes in cooperation with the partners in order to speed up the process of regeneration. After the detailed plans were approved by the local government, Regenco selected preferred developers through tender processes and monitored realisation after selection.

Private sector investments were required in order to realise the developments. Because the areas in which Regenco operates were desolate and deteriorated, there was a dearth of investors. This is why Regenco performed some initial activities that made the areas more attractive to invest in. The first and most important activity was buying land and property. One of the problems in the area was that ownership was scattered. Regenco purchased land and property strategically, cleaned it up and transformed it into more

attractive and larger pieces of land. A second aim was to proactively attract investments. Regenco set up a developers prospectus to inform developers about plans and opportunities for investment.

Since Regenco began in 2003, some projects have been completely realised, but most projects are still in the preparation phase. The regeneration should be complete in 2020.

### *Case Analysis*

The regeneration of the Sandwell area can be roughly divided into three stages. First, the process that led to the creation of Regenco can be identified (1999–2003). The creation of Regenco can be seen as an answer to the system's inert state. While many partnerships were active in the area and the council had already made a start with some regeneration projects, the council did not succeed in making serious progress in certain desolate areas for almost 20 years. On the one hand there was no interaction, cooperation and coordination between the various projects and initiatives. Partners developed their strategies independently (autopoietic self-organization) without knowledge about what the other projects were doing and where they were aiming. On the other hand, when interactions did take place, they were not productive, coordinated or constructive, and did not lead to any consolidation of results and synergy—a typical case of interferential coevolution (see Chapters 8 and 9).

The creation of Regenco initiated a transformation of the system's state from inert to dynamic. In performing its tasks—coordinating the diverse projects and processes of plan development, raising funds, buying land and property, attracting private investments, selecting private developers for project realisation and monitoring the realisation of the project—Regenco succeeded in creating productive interactions. There was a strong desire to make a fresh start, speed up the process of regeneration and give the region the extra imperative it needed. Thus, Regenco managed the process to streamline complexity by utilizing a deliberate mix of project and process management strategies.

Regenco performed various activities like initiating plans, buying property and raising funds more or less autonomously in order to speed up the process. There was a strong desire for boundary judgments and scoping. The activities were performed in a more project managerial way with the involvement of the most important stakeholders. After the first steps were taken, the involvement of other stakeholders became more and more important and the process opened up. The managers of Regenco knew that they needed other stakeholders for successful project realisation. As a result, process management strategies (relation-oriented) became more important. Since the planning powers stayed with the council and the funding of partners was required for each project or for purchasing or cleaning up land, a good relationship with and involvement of these parties was

important. In addition, Regenco had to work closely with other partnerships in the area (like the Arc of Opportunity [Regeneration Zone], SRB6 North West Birmingham Corridors of Regeneration, Greets Green New Deal for Communities, Urban Living and Sandwell Partnership) to achieve successful results.

The system's state in the third round is more difficult to pinpoint. On the one hand, processes were sometimes uncoordinated and there was no structure or ground for articulating and consolidating the plans and ideas, which indicates chaos. On the other hand, interactions were also productive, coordinated and constructive, which led to plan development and implementation. This indicates a system state of dynamics. This system state is most significantly present in this round.

In general, the same holds true in the third round as in the second: Regenco begins in a more project managerial way before shifting to a more relation-oriented management style. In the evolution from the planning to the realisation phase, the management had to deal with several conflicts between the stakeholders. These conflicts concerned, for example, (a) the domain of the URC in relation to private investors: to what extent do we make the area attractive for private investors and where do the investors start, (b) what projects are completed first: complex projects or quick-wins, (c) what is our relationship with other partnerships and stakeholders: in what ways can we act autonomously? In these rounds we can see that Regenco was in a continuous balancing act between process management techniques (relation- and support-oriented) and project management (content- and progress-oriented).

## 10.5 CONCLUSIONS

### 10.5.1 Case Comparison: Changing Managerial Styles

In comparing the three case studies in this chapter, it can be seen that in all three cases, management styles sometimes keep systems in unproductive and productive system states and sometimes unlock an unproductive system's state. Let us take a closer look at the three cases.

The Sijtwende case had a long period of inertia which was caused by a dominance of project management with elements of autopoietic self-organization, a sharp focus and project scope (boundary judgments), in which the two main actors (the municipalities of Voorburg and Rijks-waterstaat) wanted contradictory solutions. This state was altered by the arrival of a new actor, with new ideas about the solution and cooperation process. Through process management, the inert system changed to a chaotic period in which the main actors were disorientated and bewildered. However, a creative and appealing plan emerged and a process of cooperation was initiated. This hectic period changed to a dynamic system state, in which a combination of process management (relation maintenance) and

project management (making the plan feasible and implementable) became visible. This balance was disrupted, however, in the third round in which the system state can be defined as stable. In this state, project management was overemphasized at the expense of the coherence of the total plan and irritations about the way in which the cooperation took place.

In the Grift–Apeldoorn case, a similar picture can be constructed. In the beginning, there was a system state of inertia in which the main actors (the municipality and water board) strived for opposite results which they developed through go-alone strategies. They managed their own projects separately through autopoietic self-organization and strong boundary judgments. This system's state of inertia changed to chaos, in which interactions between actors were intensified to find ways to develop a coherent water program. In this interaction separate projects were connected in an overall program. Then the system stabilized and became dynamic. A combination of process and project management was observed in this state; projects had their own dynamics and were steered in a more closed environment, but at the same time different projects were placed in an overall program and steered (process management) from this view.

Some similar aspects with these two cases can be observed in the Regenco case. Here, the system's state is characterized by inertia (little interaction takes place and no progress occurs). It can also be observed that an intervention takes place through the setting up of the URC Regenco. This leads to a system's state of dynamics, in which project management takes place (development of concrete frameworks and plans), as well as process management (the bringing together of different actors). The system's state in the third round that is oriented towards implementation can be characterized as a dynamic system state, in which project management as well as process management strategies are employed.

The Regenco case is slightly different than the other two cases. Here, more emphasis is placed on project management in dealing with dynamics. In the other two cases, dynamics are coped with through process management. The URC is bound to specific performance outputs leading to a more project-based way of tackling the process. This explains the slight emphasis on project management.

### 10.5.2 Adapting Managerial Strategies to Systems Dynamics

A number of conclusions can be drawn from the single cases and their comparison. First, single project management with an emphasis on autopoietic self-organization and limited scope (strong and fixed boundaries) does not fit the systems' state of inertia. It can even lead to more inertia (conflict between actors, no progress in process and poor results). The two Dutch cases, those of the Sijtwende and Grift, demonstrate this.

Second, management intervention (through a new third party, as seen in all three cases), with an emphasis on dissipative self-organization and a

broad scope (less fixed/more flexible boundaries) is required (as seen in all three cases) to bring an inert system into a new state, a state of dynamics. Single projects and actors are connected to one another, and new projects and programs arise out of this interconnectivity.

A third conclusion is that a system's state of dynamics emerges (in all three cases), in which project and process management alternate to keep the system in this state. This dual management strategy leads to extensive and intensified interactions between actors, but at the same time also leads to results in preparation and implementation of the spatial projects and programs.

A fourth conclusion is that systems' state of dynamics is vulnerable; it easily changes to stability (and maybe even inertia) when projects and programs enter the implementation phase. Then project management orientation is overemphasized, at the expense of process management, leading to renewed strict focus (boundary judgment) and autopoietic self-organization of the separate subsystems, stressing tight focus (project scope) and own tasks, responsibilities and profits (see the Sijtwende case). This sharp focus has a negative impact on the process of cooperation and the coherence and even implementation of the plan (Sijtwende) and program (Grift–Apeldoorn).

A final conclusion is that the three case studies show that the dynamic system state is a particularly beneficial state for spatial projects. This state is managed through project and process management in the three cases. Process runs smoothly, leads to progress and accepted and creative and coherent results (plans, projects and programs). This situation is especially what is meant by a project that is on the edge of chaos or 'bounded instability' (Merry, 1999; Griffin, 1998; Stacey, 2003; McElroy, 2003). This is a system state in which subsystems are coevolving and trying to adapt to each other when necessary, and attempting to influence their environment where possible. Staying in touch with other self-organizing subsystems means dynamics: through their mutual interconnectivity, subsystems change when others do. In a situation of bounded instability, i.e. a system's state of dynamics, conditions for creativity and innovation are present (Haynes, 2003; Kiel, 1994).

### 10.5.3 Implications for Management

What practical lessons can be drawn for managers in the field of complex (spatial) projects? One lesson is that managers have to be aware that projects go through different states (from inertia, chaos and dynamics to stability in random order), and that their style has to correspond with the special state the system is in. A second lesson follows from this first lesson. Our case study showed that inert systems are not helped with project management, but need process management to get the system unlocked, and to change to a more optimal system state. Above all, the management of complex systems seems to be a *gentle counterbalancing act*, in which project

and process management have to alternate. Sometimes a manager needs to counterbalance too much stability (even inertia) through process management to get a project going, and has to counterbalance too much dynamics (even chaos) through a project management style. A final lesson is that a combination of process management and project management is required in order to (attempt to) keep a project in a system state of dynamics that is most fruitful for the process of cooperation as well as for the output and outcome of these projects (see Chapters 9 and 13).

# 11 Dealing with Complexity through Trust and Control

*Jurian Edelenbos, Jasper Eshuis*

## 11.1 INTRODUCTION

Day in and day out, managers of complex spatial projects attempt to cope with complexity arising from interdependencies among multiple actors, competing interests and institutional structures. This chapter deals with this coping behaviour, focusing on two strategies for coping with complexity: (a) control and (b) trust.

This chapter will identify many differences between the strategies of trust and control, but there is an important similarity between the two as well. Both trust and control reduce ostensible complexity by limiting the number of possibilities to be taken into account. In the case of the trust strategy, people are not required to make precise forecasts of all possible negative consequences, since they trust that the outcome will be positive (Nooteboom, 2002; Bachmann, 2001). Complexity is handled by excluding “certain possibilities of development . . . from consideration” (Luhmann, 1979: 25). Another way of handling complexity is through the use of control (Das and Teng, 2001; Leifer and Mills, 1996). The control strategy reduces complexity by regulating and reducing the number of possibilities for development.

Both trust and control are mechanisms that facilitate complex decision-making. As such, both strategies can be deployed to generate governance capacity, which is defined here as the capacity of governance systems to deal effectively and legitimately with complex (spatial) problems. This chapter studies the interplay between trust and control and its contribution to governance capacity. This relationship has not been the subject of much research to date.

The literature on trust and control often stresses the contradictions between the two; trust and control are often treated as mutually exclusive strategies. Based on the work of Deutsch (1962), many authors have defined trust in terms of the willingness to become vulnerable *to another whose behaviour is not under one's control* (see Zand, 1972; Gambetta, 1988; Lorenz, 1988; Mayer et al., 1995). In keeping with this line of thinking, the trust strategy loses its meaning and potency if elements of control are to



be involved (cf. Dasgupta, 1988). Control and trust exclude each other by definition. One *either* trusts *or* controls another.

However, the authors are uncomfortable with this approach. We believe, along with others, that the relationship between trust and control has a more complex nature. Actors attempt to enhance governance capacity through trust and control (see e.g. Das and Teng, 2001; Frankema and Costa, 2005; Inkpen and Currall, 2004).

We turn to complexity theory to understand the complicated interrelations between trust and control. The notion of coevolution helps give meaning to the relations between trust and control and enhances our understanding of the dynamics of governance capacity in public management (see also Inkpen and Currall, 2004). A distinction will be made between interferential, parasitic and symbiotic coevolution (Odum, 1971; see also Chapters 8 and 9 in this book) to describe the interplay between trust and control. In keeping with the discussion in Chapters 8 and 9, symbiotic coevolution will be used to describe a situation where the interplay between trust and control has a net positive impact on governance capacity. Interferential coevolution occurs when this interplay has a net negative impact on governance capacity. We aim to uncover how different forms of trust and control can coevolve towards an increasing governance capacity.

To summarize, the goals of this chapter are twofold:

1. to refine the existing literature on the interplay between trust and control with the help of the notion of coevolution, and illustrate this empirically
2. to provide insights that help public managers to improve governance capacity in complex spatial projects

This chapter is organized into six sections. After the first introductory section, two schools in public administration, New Public Management (NPM) and Governance, are discussed in order to position the strategies of trust and control within the scientific debate (Section 11.2). Section 11.3 describes the concepts of trust, control and governance capacity, and introduces a complexity theory point of view towards the concept of coevolution. Sections 11.4 and 11.5 provide two empirical examples of the coevolution of trust and control in relation to governance capacity. In section 11.6, conclusions are drawn and recommendations are formulated for public managers.

## 11.2 POSITIONING TRUST AND CONTROL WITHIN TWO SCHOOLS OF PUBLIC ADMINISTRATION

This section positions the strategies of trust and control within two major schools of public administration: NPM and Governance. The development towards NPM has already been described in Chapter 2. Control plays an important role in the NPM approach. Control is applied to simplify

phenomena by regulating them, not allowing randomness or chaos but reducing the array of possible trajectories. In the NPM approach, complexity of the public sector is handled through control mechanisms like performance indicators, setting explicit standards, control protocols and contracts. Ideas about new contract forms crop up in a large number of countries. They are worked out in particular detail in the UK's Private Finance Initiative (PFI) projects, but also applied in Dutch PPP projects (see Klijn et al., 2006) and others. Two conditions are often stressed (Koppenjan and Klijn, 2004):

- Clear product specification: it is essential to know beforehand what (which public sector activities) is being contracted out, and this provides the principal with a basis for evaluating the performance of the contractor.
- The need to monitor: close monitoring is emphasized because the quality of the output in a contract relationship depends on the contractor's efforts. Monitoring is considered an instrument in countering opportunistic behaviour of contractors.

The other major school of thought in public management theory is Governance, as described in Chapter 2. Here, the emphasis is on trust, in contrast to the NPM school of thought. Trust helps people to tolerate uncertainty and make decisions in case of uncertainty (Luhmann, 1979; Bachmann, 2001). Trust facilitates making decisions without complete knowledge. If horizontal, voluntary relations in modern societies are increasing in importance, trust becomes an important coordination mechanism since uncertainties can no longer be managed through hierarchical power, direct surveillance or detailed contracts (Ring and Van de Ven, 1994; Loose and Sydow, 1994; Lane and Bachman, 1998). Cooperation between different actors with diverging interests is stressed to come to effective and satisfactory results. Trust between actors is an important precondition for cooperation.

Thus, it can be seen that there is an emphasis on control in the NPM literature and more attention paid to trust in the Governance literature. In this way, both approaches tend to be one-sided. The relationship between trust and control is underdeveloped in both theories. The one-sided attention to either control or trust does not do justice to the complexity of the practice of managing spatial projects. In practice, project managers have to deal with the complex interplay between trust and control all the time. We therefore turn to complexity theory for a better understanding of the interrelations between trust and control in the complex practice of spatial development projects.

### **11.3 THEORIZING TRUST, CONTROL, GOVERNANCE CAPACITY AND COEVOLUTION**

In keeping with the arguments presented in Chapters 1 and 8 of this book, this chapter approaches coevolution as an ongoing process of mutual

adjustment and reciprocal selection between two or more phenomena. What is crucial here is the idea that adjustment between phenomena means that certain characteristics of the phenomena change. Coevolution between trust and control is about mutually related changes in the characteristics of trust and control. The characteristics of different kinds of trust and control must be identified before coevolutionary processes of particular forms of trust changing into other kinds of trust under the influence of (changing) forms of control, and vice versa, can be described.

### 11.3.1 Trust

There are many descriptions of the trust strategy in circulation. For some, trust is an expectation (see Lane and Bachmann, 1998; Rousseau et al., 1998), while for others, it is a container concept that can hardly be separated from shared norms or rules (see e.g. Putnam, 1995). Here, trust refers to a positive expectation that other actors refrain from opportunistic behaviour even when they have the opportunity to do so (see e.g. Edelenbos and Klijn, 2007). This chapter defines trust as a positive expectation in a situation in which the potential loss one suffers is larger than the potential gain. Within this definition, different categorisations can be made.

One is that trust refers to three objects of trust; namely, individuals, institutional arrangements and institutions (cf. Eshuis, 2006):

- Individual trust is the trust of a trustor in an individual, the trustee. Individual trust is based on face-to-face contact, long-term acquaintance and mutual reliable credentials.
- Trust in institutional arrangements refers to trust in structures such as organizations or contracts.
- Trust in institutions is trust in formal and informal rules. Institutions are trusted on the basis of their continuity.

Another relevant distinction is that between the different sources of trust, which lead to the following four forms of trust:

- Competence based trust: trust in the experience and knowledge of an individual or organization (see Nooteboom, 2002). This involves trusting the ability of an actor to make things work (Das and Teng, 2001).
- Goodwill trust: trust in the good intentions of an individual or organization (Nooteboom, 2002). This refers to the intentions of an actor to make things work. Goodwill trust reduces the perceived chance of opportunism (Das and Teng, 2001).
- Cognition-based trust (McAllister, 1995) is based on knowledge of the others' attitude and behaviour. This may develop when a relationship lasts long enough for actors to get to know one another.

- Affect-based trust is based on affection stemming from loyalty and empathy with the other (McAllister, 1995). This often takes a long time to develop.

### 11.3.2 Control

Control can be perceived as “a regulatory process by which the elements of a system are made more predictable through the establishment of standards in the pursuit of some desired objective or state” (Leifer and Mills, 1996: 117). Loosely based on the literature that distinguishes between internal value-based control and external measure-based control (Das and Teng, 2001; Eisenhardt, 1985; Ouchi, 1979), four types of control are identified here:

- Informal control, which is organized in an informal way. Informal control may be based on internalization through socialization but also on informal monitoring that takes place among actors in everyday life.
- Formal control: this relies on formal rules and procedural rationality (Eisenhardt, 1985). This often implies predefined indicators and planned procedures for control, and can be carried out through formally institutionalized monitoring schemes and through output indicators.
- Internal control. The main thrust of this form of control is that systems, actors or groups control themselves. Internal control reduces goal incongruence and the divergence of preferences among groups of actors (cf. Das and Teng, 2001). Internal control may be value based (organized formally through selection or training, or informally through socialization) or measurement based (organized through formal monitoring schemes and auditing procedures, or informal monitoring in everyday life).
- External control: this is control that comes from outside a system or group, for example, when an independent organization is hired to carry out monitoring (Eshuis and Van Woerkum, 2003).

### 11.3.3 Governance Capacity

It is not just the relationship between trust and control that is explored here, but also its impact on governance capacity. When trust and control reinforce each other, this is called symbiotic coevolution and has a positive effect on governance capacity. When trust has a damaging effect on control, and vice versa, this is referred to as interferential coevolution. This interplay has a negative effect on governance capacity.

The concept of governance capacity was introduced by Innes and Booher (2003) and their description of it is taken as the starting point here.

Governance capacity is taken to mean ‘the capacity of governance systems to deal effectively and satisfactorily with complex problems’. Support for projects and their outcomes indicate that governance systems achieve satisfactory outcomes (see also Van Buuren, 2006).

#### 11.3.4 Interferential Coevolution: Trust and Control as Substitutes

Several scholars have approached trust and control as a zero-sum game, and described negative relationships between trust and control (see e.g. Bradach and Eccles, 1989; Gambetta, 1988; Ring and Van de Ven, 1994). They have stressed how trust and control interact as substitutes, without dealing with changes in the nature of trust and control. The idea is that the presence of trust leads to a decrease in opportunism and therefore there is less need for control (Gambetta, 1988). A decrease in trust would lead to an increase in opportunism and a stronger need for control.

On the other hand, more control is thought to lead to less trust because control can be seen as a sign of distrust (see Goshal and Moran, 1996; Sundaramurthy and Lewis, 2003). Moreover, the more an actor is able to control someone else, the less he has to rely on trust. The use of control instruments may also diminish the intrinsic motivation among actors to behave in a trustworthy manner. This is called the ‘crowding-out effect’ (Frey, 1993, 1997; Sundaramurthy and Lewis, 2003). In short, the substitutive point of view implies that trust removes the need for control and control chases away trust.

In public management, the substitutive view of trust and control implies that trust lessens the need for legal ordering or contracting as modes of control (see e.g. Bradach and Eccles, 1989; Zaheer and Venkatraman, 1995; Nooteboom, 2002). Contracts are not required (or require less specification) because trust provides the basis for coping with uncertainties. In this way “trust can (. . .) be seen as a psychological contract that holds certain expectations of the behaviour of the other party” (Klein Woolthuis, 1999: 56). Contracts decrease the level of trust, because they place too much emphasis on negative aspects such as the use of coercion or the threat of sanctions. The substitutive view of trust and control places legal and social governance in opposition to each other. Strengthening trust implies a weakening of control, and vice versa. Public managers must find a productive balance between working on the basis of control and working on the basis of trust.

Das and Teng (2001) have come close to a description of coevolution when they describe how different forms of trust influence control, and how different forms of control influence trust. They argue that formal control (on outputs and behaviour) undermines goodwill trust and competence trust. Formal control throws the goodwill of actors into doubt, which creates “an atmosphere of mistrust” (Das and Teng, 2001: 263). Formal behavioural

control tends to give the impression of a lack of trust in the competency to decide how to realise end-goals.

When an organization uses specific measures for output control, for example in a partnership, this is easily regarded as a lack of trust in the competence of partners to decide what is best for the partnership. An emphasis on output control may lead to a focus on particular indicators and short-term results, without taking into account integral outcomes or the long term.

### **11.3.5 Symbiotic Coevolution: Trust and Control as Complements**

Trust and control can also be seen as complements to each other. In this view, they do not harm each other but rather, mutually reinforce each other (see e.g. Bachmann, 2001; Luhmann, 1979; Zand, 1972). Through mutual reinforcement of trust and control, symbiotic coevolution can develop. In this view, there can be synergy and positive mutual adjustment between (forms of) trust and control. A positive change in trust leads to a reinforcing effect on control, and vice versa. This reinforcing process results in a higher level of governance capacity.

How can the positive relationship between trust and control be explained? Zand (1972) argues that people who trust each other are more inclined to provide timely and accurate information. This facilitates control. In cases where people do not trust each other, they will try to minimise their vulnerability vis-à-vis the other and evade control by the other. If evasion causes suspicion, this may lead to increasing attempts to control, increasing distrust and increasing evasion. A downward spiral of decreasing trust, increasing attempts to control but decreasingly effective control develops. Das and Teng (2001) confirm this, explaining that trust reduces the level of resistance, and brings harmony to the controller–controllee relationship.

Control may increase trust by providing a ‘track record’ for those who perform well. In controlled (monitored) processes, actors may increase trust by displaying their good intentions and competences over time in well-understood circumstances (see e.g. Dasgupta, 1988: 53; Das and Teng, 1998). Reputation-based trust then develops (see Lewicki and Bunker, 1996). Besides, the act of voluntarily submitting oneself to monitoring can increase trust. “When one is prepared to be monitored, one indicates that one has nothing to hide” (Eshuis and Van Woerkum, 2003: 385).

A view of trust and control as mutually reinforcing strategies has implications for public management. In this view, trust increases the preparedness to be vulnerable and to commit oneself to a relationship (see Zand, 1972). Contracts can be seen as the consolidation of this commitment. As such, trust would precede a contract and a contract can be understood as a sign of trust or the consolidation of trust (Durkheim, 1984: 215). Drawing up a contract facilitates the development of trust in a partnership. In this regard,

some refer to ‘agreement trust’, where a contract is a source of trust (e.g. Zucker, 1986; Deakin and Wilkinson, 1998: 146). In a similar vein, (legal) rules can enhance trust. Luhmann (1979: 35–36) explains this in the following way: “the legal situation and the possibility of sanctions in the event of breach offer some support to someone considering whether to trust”. In other words, thanks to the latent existence of potential control options, actors need not fear that their trust will be breached. This facilitates the development of trust. Note that Luhmann stresses that in the context of a trusting relationship it is crucial that rules are latent, and only mobilized as an ultimate appeal (when no other option is available). In case of trust instruments of control operate “tacitly, without poisoning the relationship with the threat of sanctions and thus putting paid to emergent trust” (Luhmann, 1979: 36). In terms of types of control and their influence on forms of trust, this implies that external control can increase individual trust.

Another mechanism of forms of control positively influencing types of trust can be found in Das and Teng (1998, 2001). Here it is proposed that informal control has a positive effect on intentional trust and competence trust (as opposed to formal control which has a negative effect). During the interaction required for social control, people get to know each other better. This may enhance cognitive trust, as well as intentional trust and competence trust. People become familiar with the frames of references used by other actors, the intentions driving their actions and their competences.

## 11.4 THE CASE OF BREDA’S CITIZEN PARTICIPATION

### 11.4.1 Setting the Scene

In 2000, the municipality of Breda started a project called ‘Lusten en Lasten’ (Likes and Burdens). The project was part of a long-term program for the ‘co-production of liveability’, in which Breda was seeking new forms of cooperation and communication in urban renewal. After 15 years of planning, citizens no longer trusted the local government to actually solve persistent problems in their district, such as safety, unemployment and ageing. Citizens in the northeastern district of Breda felt that it was time for action. They did not have faith in the implementation power of Breda to handle the severe problems in their district. In reaction, the municipality attempted to leave behind its planning culture, which was weak on actual implementation, by involving citizens in the improvement of their own surroundings through implementation projects developed by citizens themselves.

An important aspect of this project is that citizens were themselves responsible for improving the liveability of their own surroundings and district. Citizens had at their disposal a budget to resolve problems in their district. The allocated budget formally remained the property of the municipality, but citizens had freedom in the disposal of the budget. Citizens

themselves were responsible for finding actors who were prepared to help implement the plan. A team of civil servants and professionals assisted in this process. This team was called the 'implementation team'. It consisted of professionals from the municipal agency, societal organizations and external advisors. This team monitored the implementation of ideas, and appointed contact civil servants (*contactambtenaren*) who adopted a single project and kept an eye on this project during the implementation organized by citizens.

### 11.4.2 Zooming in on the Case

In the Likes and Burdens project, the division of roles was reversed; citizens were in charge while local government followed and facilitated the projects. The municipality offered assistance through money and guidance by *contact civil servants* who acted as intermediaries between citizens and the municipal government. As a result, the lines of communication were short. These civil servants also supervised the ways in which citizens filled their roles. Citizens held the roles of principal, budget holder, initiator and project manager. This was new for them. In order to fulfil their supervisory role, civil servants gathered information on the projects at hand and developed low-profile control mechanisms.

At first, the citizens took on this way of working with great enthusiasm. Citizens felt they were being taken seriously and were under the impression that the municipality trusted them to improve the neighbourhood. The district budgets created momentum to realise successful projects.

In the first round in the year 2000, citizens came up with 220 ideas for projects. Eventually, 18 projects were selected for implementation with a total budget of €315,000. The projects varied from creating playing zones for children to establishing a new crossover and organizing sports activities.

Because citizens were in charge, they were able to influence the velocity and effectiveness of the implementation of their projects, and trust that something was actually being done to improve their neighbourhood situation. The relationship between citizens and the municipality improved through this project (see also Van de Wijdeven et al., 2006). The fact that the projects had a short-term orientation leading to quick results contributed to maintaining enthusiasm and generating faith in the overall project.

However, in the second round (2001), a change event occurred. After an incident occurred, there was a shift in the way that citizens were approached and controlled by the municipality. One citizen project went badly; its implementation failed and financing of the project almost got out of hand (Edelenbos et al., 2005). This bad practice was alerted to the City Council and led to a change in the attitude of most contact civil servants and affected the way in which supervision was carried out. The agencies 'behind' the contact civil servants in the front line, in particular, pressured



the contact civil servants to tighten control. Also, several contact persons themselves wanted to tighten their grip on the projects.

Supervision became more tight and formalized. Contact civil servants set new rules and conditions, and increased their grip on the citizens' projects. The initial distance and supportive attitude of the civil servants changed into a desire to check and control the projects through several bureaucratic rules and conditions.

An example of this is the development of more stringent control through rules about hiring contractors to implement the projects. The local government provided suggestions for hiring specific contractors. Citizens felt that their projects were being taken over by the local government agencies. The amount of room to manoeuvre was restricted. The original idea of a bottom-up and demand-driven approach was now being altered towards a top-down approach.

In a few projects, tasks and responsibilities were even taken over from the citizens with the argument that citizens could never be held accountable when things failed (Edelenbos et al., 2005). As a respondent from the municipality Breda commented: "When projects run badly, the municipal civil servant is always held accountable. You cannot expect a citizen to justify oneself".

Citizens regretted this development, certainly at this point of time when local government finally seemed to be changing their way of developing and implementing projects (Weterings and Tops, 2001: 17). Citizens considered this move as a sign of distrust by the local government. The intervention by the municipality caused frustration and demoralization among many citizens. After this, there was a small decline in the number of plans and ideas that were submitted. The local government argued that this decline could be explained by the fact that citizens ran out of ideas (Edelenbos et al., 2005).

The intervention by the municipality reflects a counter-reaction to demand-driven approaches which sometimes—when such an approach does not run smoothly—strengthens. The local government's inclination is to keep a handle on issues. In the eyes of several civil servants, working with district budgets threatened standard procedures, and more importantly, the order as controlled by the municipal bureaucracy (Weterings and Tops, 2001: 36) The result is that all kind of rules and routines become dominant again and infiltrate the more informal, less bureaucratic way of implementing policy projects. Citizens interpret this as "they—the civil servants—take over and impose their frame of reference and ways of behaviour on the projects" (Weterings and Tops, 2001: 20).

The decline in enthusiasm was temporary, however. Over time, the balance between self-organization in the district and control from the municipal agency has been restored. Contact civil servants are now able to hold more control from the municipal agency. They fulfil a role as intermediaries between citizens and bureaucratic municipal organization. It is especially through these kinds of 'process managers' and 'facilitators' that the implementation of this overall project is considered to be so successful (see also Van de Wijdeven et al., 2006).

### 11.4.3 Analyzing the Case

#### *A Negative Cycle of Trust, Control and Governance Capacity*

This case illustrates the interplay between control and trust as coexisting substitutes. Formal and stringent rules of control were formulated. These were in contrast to the informal and relatively loose character of control before the incident. The new control parameters were imposed on the citizens by the municipal agency. This was contrary to the original idea that citizens would decide on the development of their neighbourhood. Taking over control of some projects in a top-down manner (without discussion) led to distrust. This change caused frustration and was seen as a sign that the government did not trust the citizens and their way of working. As a reaction, citizens' trust in the government agency as an institutional arrangement declined.

When taking a closer look at the characteristics of trust and control, it can be seen that in the period in which a few projects ran less successfully, the municipal agency tightened its grip through formal rules and close supervision. Their trust in the competence of citizens had declined. As professionals and experts, they followed the projects with suspicious concern, because they knew most citizens had little or no experience in making and implementing plans. Civil servants partially substituted trust for control, and exchanged trust in individual citizens for trust in institutions and institutional arrangements.

However, this kind of institutionally based trust and tight control through new rules, which were determined in a one-sided manner, were not welcomed among citizens. They did not trust bureaucratic rules as a way of actually realising solutions. Had the municipality not been formulating plans to improve the district for over 15 years, without realising actual improvements? Citizens distrusted the competence of the municipal agency to implement solutions in the district. They trusted their own competence more.

As a result, it can be seen that during this period of time (2000), the implementation of some projects came to a standstill, and new projects supported by citizens were not created for a while. During the following period (2001), fewer ideas and plans were developed by the citizens. All in all, governance capacity improved, compared to the period before the start of the project *Likes and Burdens*, but in 2000 a negative interplay between trust and control led to a (temporary) decrease in governance capacity.

#### *A Positive Cycle of Trust, Control and Governance Capacity*

The same case, however, also indicates that symbiotic coevolution between trust and control is, in fact, possible. In the initial phase of the project, citizens had a formal say in developing and maintaining their surroundings. Public managers displayed trust in citizens by providing them with the power to allocate resources. Citizens had the freedom to develop and execute plans for improving their environment. However, this does not imply that

the local government withdrew completely. The municipality supervised the progress of the local projects. This supervision took the shape of control from a distance. Contact civil servants supervised how citizens carried out their projects. They intentionally remained at a distance; the idea was that citizens needed to discover things for themselves, and that tight control would impede citizens' initiatives. When citizens met with obstacles, they could ask the contact civil servants for help. Supervision had a mainly informal character. Citizens and civil servants talked the projects through in face-to-face meetings at the request of the citizens. The contact civil servants operated as 'street-level bureaucrats' in the sense that they were often visible in the local areas where the projects were being implemented. This ensured that civil servants and citizens were able to find each other easily. In this way, the contact civil servants did not have to make an extra effort to obtain updated information on the progress of the projects. Interaction and communication between the civil servants and the citizens flourished in this positive ambiance. It was easy for the civil servants to supervise the projects without making citizens feel as if they were being monitored.

It can be inferred from this that the specific way in which control is developed and implemented has a positive effect on building trust, especially competence- and intentional-based trust. Citizens have the opportunity to develop their competence in making and implementing projects with the help of civil servants and other professionals. The characteristics of control are informality, face-to-face communication and facilitation instead of inspecting attitude (contact civil servants acted as *servants for* the citizens). Control is not (formal) rule based, but informal and aimed at the realisation of a common goal, namely, a proper implementation of the citizens' project. This fuels trust in the competence of citizens in implementing the projects themselves.

A positive interplay between trust and control emerges, resulting in a growing governance capacity. The program has resulted in the realisation of a great number of projects (over 100) within five years, less bureaucracy and an improving liveability of the direct surroundings of citizens and the northeast district as a whole—reflecting an increased governance capacity. Apart from quantity there is also a sense that quality has been realised: citizens from the district are satisfied with the outcome of the projects, which is reflected in ongoing support for the Likes and Burdens approach. Moreover, the project has had a spin-off; in another district called Heuvel a similar demand-driven approach has been carried out, indicating that this method of working pays off well. District Heuvel has implemented 50 projects so far.

## 11.5 NATURE CONSERVATION WITH COOPERATION BETWEEN FARMERS AND A MUNICIPALITY

### 11.5.1 Setting the Scene

After a long history of conflict, the authorities of a Friesian municipality and an environmental cooperative of farmers cooperated on landscape management

and conservation. The local government paid farmer members of the cooperative for implementing parts of the municipalities Landscape Policy Plan.

The Landscape Policy Plan was developed in the early 1990s. The plan met with protests from farmers who feared it would threaten their farming business. As a result of the plan, the farmers had the feeling that the municipality prioritized the conservation of the landscape over agricultural production. The farmers began to distrust the intentions of the municipality with regard to agriculture.

### 11.5.2 Zooming in on the Case

Implementation of the plan turned out to be problematic because many farmers refused to cooperate. Governance capacity was low. Sometimes the police had to intervene to prevent farmers from illegally removing hedges. This raised suspicion among officials with regard to farmers' willingness to take care of the environment. Mutual distrust had developed between the municipality and the farmers. However, both the farmers and the local government gradually began to realise that things had to change. The municipality realised that the policy process would not be successful without the cooperation of the farmers, and the farmers realised that not complying with the law would lead to a lot of trouble.

During this period, farmers in a neighbouring municipality initiated an environmental cooperative and started a subsidized landscape management project. Their success in landscape management and the fact that they were able to earn money from this project led the farmers in our municipality to become interested in doing the same thing.

They came to the conclusion that it would be in their interest to engage in landscape management. A couple of farmer-leaders therefore created an environmental cooperative. The cooperative sought to protect the landscape and earn money from this. The farmers approached the municipality for a subsidy. The municipality received the farmers' initiative positively, because it thought that this would increase governance capacity with regard to landscape management. During the first round of talks between the farmer members of the cooperative and the municipality, a form of interest-based trust developed; they started to trust each other a little because they developed the idea that they had the same interest—namely, landscape management. However, the farmers had not proven their competence in this field, nor did the municipality fully trust the farmers' intentions because there was a suspicion that the farmers only wanted the subsidy but were not really interested in carrying out landscape management properly.

Thus, the issue of trust was still problematic, but what helped was that the alderman at the time was a farmer himself. This led to some individual trust between the alderman and the farmer-leaders, and facilitated the initial contact between them.

After some discussion, the municipality appeared to be willing to finance landscape maintenance by the environmental cooperative, as long

as there would be proper inspection. The municipality wanted control, as they did not have enough trust in the farmers or their environmental cooperative.

A formal monitoring system with specified output control parameters was developed, and an independent inspection committee (monitoring team) was installed. This was done in close consultation between the environmental cooperative, the municipality and an NGO called Landscape Management Friesland (LBF). The municipality and the farmers each selected one member of the team. A third member was someone from the independent NGO called 'Nature and Environment'. Agreement was reached among the parties on the team as a whole, which meant that the monitoring team was accepted and trusted by all the parties. The parties had selected the members of the team not only on the basis of their independence, but also on the basis of their expertise. They had selected people with field experience of the implementation of landscape management. The farmers accepted the inspection activities of the monitoring team, as they trusted in its competencies (expertise) and intentions (independence). Because the monitoring team was trusted by the farmers, it was able to carry out its work without being met with protest.

Thanks to the monitoring process, farmers were able to prove that their agricultural conservation was proper, and this built trust with the municipality. Also, during the nature conservation process, the environmental cooperative as an institutional arrangement inspired trust within the municipality. The monitoring system facilitated a coevolutionary change from thin interest-based trust and formal control to trust in the competence of the farmers and the cooperative, and trust in the intentions of the farmers and their cooperative.

The inspections by the monitoring team were carried out on the basis of a system agreed upon by the parties involved. The system was not new, but rather one that had been developed and applied in the region for years in many partnerships between the LBF and farmers.

The way in which the monitoring team utilized the control system was crucial. The monitoring team conducted inspections within the spirit of the law: inspections were not geared towards checking to see whether landscape maintenance met the output criteria precisely, but mainly to determine whether it had been carried out properly in relation to the ultimate goal of landscape maintenance. Since the monitoring team had expertise and was trusted, it need not follow the letter of the law. In this way, the level of trust among farmers increased. Since the team was strict in terms of the ultimate goals, it also enjoyed the trust of the municipality.

Another important aspect was that the monitoring team was less strict in the first year, and became stricter in the following years. In this sense, a loose form of control changed into a strict form of control. This gave farmers room to improve their performance in case they did not meet the

criteria in the first year, without facing fines immediately. The monitoring team displayed trust that the farmers who did not meet the criteria in the first year would meet the criteria in the second year even if they were not penalized immediately.

The monitoring team thus displayed its good intentions. They were not out there to catch as many wrong-doers as possible; rather, they wanted to give the farmers a genuine opportunity to implement nature management in the manner that had been agreed upon. This method of control built trust among the farmers. It prevented governance capacity from being dropped after the first year for two reasons. Firstly, it prevented farmers from quitting when they were not able to meet the criteria in the first year itself. Secondly, it prevented new resistance from developing on the part of the farmers, which would have impeded further implementation of the Landscape Policy Plan.

### **11.5.3 Analyzing the Case**

In this case, there was symbiotic coevolution between control and trust; control in the shape of formal monitoring increased trust. The independence of the monitoring team generated trust in the intentions of the team, while expertise built trust in its competencies. Thanks to this trust, the monitoring team was able to do its work in a way that contributed to the implementation of landscape management and governance capacity. The municipality gradually began to trust the farmers as the monitoring showed that landscape management was being properly carried out.

Control increased trust because it was carried out in a way that was agreed upon by all parties, and by a committee that was agreed upon by all as well. The development of the control system had been conducted in a collaborative and mutually coordinated manner. Initial thin trust made possible the collaborative way of creating and implementing a monitoring system, which then contributed to further trust.

What added to trust was that the competencies and intentions of the committee were perceived positively. Moreover, the control instrument was seen as one that would contribute to a common goal, namely, proper landscape management.

Governance capacity increased through the coevolution of trust and control, which is evidence for the possibility of symbiosis between trust and control. Trust gave parties enough room to manoeuvre during implementation and it prevented parties from attempting to gain strict and stiffening control. Trust may also have directed the actions of actors towards proper implementation of the landscape management because the parties did not want to disappoint let alone cheat the other parties who had placed their trust in them. Control further steered their actions and prevented them from inactivity or neglect.

## 11.6 CONCLUSIONS AND RECOMMENDATIONS FOR PUBLIC MANAGEMENT

### 11.6.1 Conclusions

This chapter has shown that different coevolutionary pathways of trust and control exist, and has dissected how different forms of control may enhance or decrease different forms of trust, and vice versa.

The Breda case showed how initial distrust and a lack of governance capacity developed into more trust and more governance capacity after the municipality had trusted its citizens and combined this with informal forms of control. A symbiotic coevolution took place between trust and control; the specific form of control (informal, based on face-to-face communication and at a distance) fit well with the idea of providing citizens with more influence and this reinforced trust, specifically competence- and individual-based trust. This resulted in an increased governance capacity, which is reflected in the implementation of a significant amount (quantity) of satisfactory (quality) projects. The case also suggests that mutually reinforcing feedback between trust and control can change into a loop of decreasing trust and formal control after a change event. Instead of seeing the interplay between trust and control as vicious cycles that can go either upward or downward (see e.g. Zand, 1972), the interplay between trust and control should be understood as a fluctuating and sometimes erratic form of coevolution.

In the interferential coevolutionary relationship, the citizens were seen to approach the formal control negatively, especially because they felt that it violated earlier agreements to provide citizens with more say. Competence-based trust was substituted for control, and trust in individual citizens was exchanged for trust in institutions and institutional arrangements. However, citizens had no trust that bureaucratic rules would actually lead to an improvement in their surroundings. Ultimately, this resulted in a declining governance capacity when projects came to a (temporary) standstill and new projects were not initiated.

The Friesian case shows how formal control can coevolve with interest-based trust into cognitive trust (in individuals and organizations) when inspectors use formal control to gain knowledge of how controllees think and work. This cognitive trust is based on knowledge of both intentions and competencies, thus being related to both goodwill trust and competence-based trust. The coevolution of formal control with cognitive trust in individuals and organizations diverges from the Breda case where formal control led to decreasing trust. How can we understand this divergence?

An explanation can be found in variations in the initial conditions (see also Chapter 4) of the two cases. In the Breda case, the parties had agreed on trusting citizens groups to initiate and implement projects. Control would be applied internally by the groups themselves in combination with informal control by contact civil servants. After one incident, however, the



municipality took control, resorting to formal control. What caused distrust among citizens in this specific trajectory was that citizens thought they had an agreement on coordination-based on trust and informal control, and then this agreement was tampered with.

In the Friesland case, formal control coevolved symbiotically with trust because the starting condition was that the parties had agreed on this formal control. Collaboratively, parties came to the conclusion that this form of formal control would increase their chances of success. Formal and hierarchical control, implemented by an independent and trusted committee, is conducive to trust when there is mutual agreement on the way in which control is developed in parameters and the method of inspection.

This finding has implications for the existing thinking on the relationship between trust and control. Das and Teng (1998, 2001) have argued that some kinds of control increase trust, while others decrease trust. Their point is that formal control may undermine trust, while social—or informal—control may increase trust. This is true in some contexts, but false in others. The Breda case provides evidence for this argument, but the Friesian case counteracts it by showing that formal control can contribute to increasing trust when parties agree on formal control in order to realise a common goal.

It can therefore be concluded that the coevolution of trust and control depends on the specific situation in which the relationship between trust and control unfolds. Trust and control are related through complex and contingent causation, resulting in divergent paths of coevolution. Thus, it is impossible to formulate general laws about the relationship between trust and control. At the same time a couple of patterns of combining trust and control in productive ways have become visible from the case studies. On the basis of these patterns, we attempt to provide public managers with some recommendations for negotiating the complex relationship between trust and control.

### **11.6.2 Recommendations: In Search of Combinations of Trust and Control**

Complex (spatial) projects cannot be approached by relying on either trust or control. Public management is the art of combining trust and control in such a manner that symbiotic coevolution between the two emerges. This is relevant to two main streams of public administration, NPM and Governance, which tend to concentrate on either control or trust.

When dealing with complexity, public managers need to develop a dual approach (Teisman, 2005; Klijn et al., 2006) based on a combination of strategically and situationally chosen forms of trust and control. When decisions have to be made between an emphasis on particular forms of trust or control, the emergent combination of trust and control needs to be an integral part of their considerations. In doing so, trust and control must



be approached in specific appearances and combinations, not as general and isolated concepts.

One recommendation for public managers is to attempt to develop the art of gentle combination and alternation of trust and control. Public managers need to develop creative tensions (Nooteboom, 2006) to shift gears from trust-based coordination to control-based coordination and back. What is crucial when shifting gears is not to lose sight of the combination as a whole.

Rather than switching from trust to control, the art is to subtly switch from an emphasis on trust to an emphasis on control and vice versa, depending on what is required in the specific context and with full awareness of the fact that one is actually working on both simultaneously. Combining trust and control may be compared to skiing; when skiing one continuously uses two legs, but one changes the amount of weight placed on one or the other leg in order to maintain balance and keep to the right direction in a continuously changing environment.

It is crucial for public managers to use instruments of control not only as instruments of control, but also as a means of increasing trust. Similarly, trust should not just be developed as a value as such but also as a way to increase control on a complex project. This form of double-acting implies that tools for control are better utilized not just for purely increasing control, but also as ways through which trustful relationships can be developed and enhanced. Tools of control become part of the management of trusting relationships. Trusting relationships become part of the management of control.

The second recommendation is to pay attention to (subtle) differences in the different types of control and trust. Control can be applied in different forms, for example formal or informal, internal or external and output oriented or behaviour oriented. Trust has different faces too: individual based or institutional based, competence based or intention based. The difficulty is that there are no standard ways of combining control and trust; they are related in contingent ways, resulting in varying coevolutionary pathways. Notwithstanding the impossibility of providing universal recommendations for public managers dealing with trust and control, lessons can be learnt from the case studies in this chapter.

Generating governance capacity through productive combinations of forms of trust and control depends on the starting (contextual) conditions (compare Inkpen and Currall, 2004). Thus, guidelines for managers have to recognise these differences. Without pretending to be able to cover all possible starting conditions, four starting conditions that many public managers encounter in practice are discussed here. It is important to recognise that these guidelines cannot be treated as rigid formulas dictating how public managers have to react to particular situations. Rather, they should be treated as ways of working that have worked in the context of the cases here and seem worth trying out in other cases as well.

1. A starting context of high mutual trust (usually cognitive- or empathy-based trust): the manager in a controlling function has faith in the competences and goodwill of the organization being controlled. In this context, control can take place at arm's length, through control at a distance and on main lines. Control is carried out through informal interaction and face-to-face communication aimed at updates on the progress of the project. As long as the invested trust is not misused by providing false information or displaying opportunistic behaviour, the trustworthy relationship will be reinforced and extended. Imposing control through new rules (institutional trust) can break down the trustworthy relationship.

2. A starting context of mutual, moderate, interest-based trust: in this context, public managers may want to exert control, as their trust is limited. It is possible to manage the combination of trust and control by applying formal control. However, the formal method of control has been the subject of prior discussion and collaboration and is now being accepted by the controllee. Agreement has been reached about the specific form of control, about the detailed level of information and the sort of information. The rules of the game have been mutually set and both parties have developed a degree of institutional trust in these rules of the game. It is important for control instruments to be perceived as contributing to getting at the common goal. This will increase trust in a positive outcome of the project.

3. A starting context of initial distrust and negative experience with formal and tight control: in this starting context, the collaboration between the actors involved is not going well. There is mutual distrust (no belief in the good intentions or competence of the other). Tight control has not been beneficial in forcing the other actor to conform to the wishes of the controlling organization. Continuous efforts to impose control will only lead to further distrust in the intentions of the other party, and will do no good in this situation. In this context, the providence of conditioned initial trust can be used. By giving the other the benefit of the doubt—there is at least some trust in the professional competence of the other actor—the public manager (at least) provides the opportunity to display trustworthy behaviour. If trust is reciprocated by trustworthy behaviour, more trust can be built. The initial trust is, however, conditional. When trust is not repaid by trustworthiness, the public manager enters a difficult situation. It becomes clear that he cannot rely on trust, and that he needs to place emphasis on control. In any case, the public manager should attempt to reach a common ground for exerting control by developing control parameters collaboratively. This may help to (re)establish good relationships and begin the process of evolving trust anew.

4. A starting situation in which there is distrust but also preparedness to accept formal control in order to establish a breakthrough. However, there

is insufficient trust between the organizations involved to come to an agreement on the specific arrangement for formal control (for example, control parameters), let alone to allow one organization to control the other. Due to distrust, there is also reluctance to provide initial trust as in situation 3. In this case, the actors can resort to the activation of external control, i.e. a controlling body that is not the principal, but an independent organization that is a recognised authority (reputation, competence) and trustworthy (because it is independent and because of earlier positive experiences in prior projects) to the actors involved. In the externally controlled process, both parties can be shown to be trustworthy, and contribute to the development of organizational trust. In this way, specific forms of trust and control coevolve, leading to continuing interaction.

# 12 Complexity Theory and Evolutionary Public Administration

## A Sceptical Afterword

*Christopher Pollitt*

### 12.1 INTRODUCTION

The authors of this book have shown rare academic courage by inviting me—as someone known to have a sceptical attitude to their principal ideas—to comment on their achievements. I am conscious of, and grateful for, the privileged role which they have afforded me. Whilst my reading of the forgoing chapters has not dissolved all my doubts (few would have expected that) it has given me a much better appreciation of the enterprise upon which complexity theorists are engaged, and of the relations of that exercise to other scholarly themes and perspectives in the field. Compared with a number of other works on complexity theory which I have read, I believe this book sets out its assumptions, aims and methods with much greater clarity. It also offers extensive empirical applications of the main concepts, which, again, is a welcome enhancement of the highly abstract approach which sometimes predominates elsewhere in the complexity literature.

I will organize my comments and arguments under three main headings, each taking the form of a fundamental question. The three questions (or, more precisely, sets of questions) are as follows:

1. What kind of animal is complexity theory—epistemologically and ontologically?
2. How is one supposed to ‘do’ complexity theory? What are the most typical and appropriate methods?
3. What is the added value of complexity theory—how and for what does it generate more powerful explanations than the alternative theories which are already available?

### 12.2 WHAT KIND OF ANIMAL IS COMPLEXITY THEORY?

The first thing to say about complexity theory is that it is—for the most part—very abstract and very general. It is a theory about almost everything, rather than a theory about some specific sector, process or problem.

In that sense it is very ambitious, aiming (apparently) to describe and elucidate the whole of the ‘modern condition’, at least as far as governance and public administration are concerned. It also tends to be expressed in a rather abstract way—the first two chapters, for example, contain hardly any concrete examples or empirical evidence, although that changes later in the book. The key concepts that are introduced—dynamics, self-organization and coevolution—could be applied to almost anything: education policy, development aid, telecommunications regulation, the global debate over climate change, the enlargement of the European Union, the organization of a local anti-crime campaign. Throughout the book one encounters statements of great generality and abstraction, for example:

- “Outcomes depend on multiple causes and these causes interact in an unpredictable manner, which leads to non-linear behaviour and self-organizing effects in different directions” (Chapter 3).
- “This chapter explores the concept of self-organization in understanding the way in which metropolitan areas develop and attempts to improve our understanding of how different types of self-organization can reinforce or weaken governmental action” (Chapter 6).
- “[T]he self-organization perspective allows for an understanding of actions on a broader scale with attention paid to the power of dynamics, the interplay between reorganization and bottom-up forms of self-organization” (Chapter 6).
- “[N]on-linear developments are the normal state of public management systems” (Chapter 7).
- “Implementation therefore will usually be subjected to ‘strange’ actions and interactions” (Chapter 4).
- “[A]ll evolution is in fact co-evolution” and “systems never reach an optimal equilibrium” (Chapter 8).
- “Coevolution between systems is therefore a matter of reciprocal selection with the results not fully determined by intended selections made by policymakers but stemming from the entire complex of reciprocal selections” (Chapter 8).
- “Systems are not only highly dynamic, but also temporarily in a specific system state (see Chapter 1). This means that systems find themselves in a state between inertia and chaos. This is not a stable equilibrium but a punctuated equilibrium in which negative and positive feedback mechanisms hold the system at one point temporarily” (Chapter 10).

What is clear in these statements is that claims are being made that stretch far beyond any evidence that is (or could be) presented as part of the cases examined in this book. What is less clear is where there is (or could be) the empirical work to support such broad claims. The suspicion of reification (e.g. of ‘systems’ and ‘governance’) lingers in the text. It is not always

entirely clear whether these are really claims about the external world at all—sometimes such statements seem to be more about defining abstract concepts rather than indicating empirical regularities. To be fair, however, it must be acknowledged that some chapters are much more cautious about making sweeping generalisations than others, and the ‘methodology chapter’ (Chapter 3) specifically warns that modesty is in order. In Chapter 11, also, the authors strongly emphasize the importance of contextual specifics, and say very directly that “it is impossible to formulate general laws about the relationship between trust and control”. Elsewhere, however, less restraint is in evidence.

Many of the definitions of key concepts are similarly couched in extremely general terms—which go some way to explain the generality of the findings, since if the ‘conceptual boxes’ are so big and vague then the findings and discriminations between them cannot be expressed in a very precise way. Here are just a few examples of core definitions:

- “‘Entities’ is a very general term that can refer to individuals, teams, organizations, etc.” (Chapter 2).
- Self-organization is “the appearance of structure or purpose without an external agent imposing it” (Chapter 7).
- Coevolution (Chapter 8) is described thus: “systems are not evolving in an isolated environment, their environment evolves as well, and this environment consists of other systems and actors within these systems. Evolution is thus not a unilateral cause–effect relation, but a mutual process between all elements in a particular case.”

All this already raises the possibility that the ‘jam will be spread rather thin’, i.e. that complexity theory may have a little to say about many things but not much to say about most particular and specific things—a theme I will return to later. In the opening chapters this effect is amplified by the relative absence of specific propositions. By contrast, other theories that are of very general application and which are widely employed in public administration (such as, say, Lindblom’s model of incrementalism, Simon’s theory of bounded rationality or March and Olsen’s model of the logic of appropriateness) lead fairly directly to specific and testable propositions.

To move on, we can ask where does complexity theory stand in relation to the great epistemological and ontological battles and boundaries of our time? (Roughly, epistemological = ‘knowability/the status of knowledge claims’, ontology = ‘reality status’; Yanow and Schwartz-Shea, 2005: pxi.) Therefore, we may ask (to use the classification deployed in Chapter 3) whether it is positivist, critical modern or postpositivist. We may also enquire where it stands in relations to the ongoing debate over the relative influences of structure and agency.

Let me attempt a short and crude answer to these questions, and then work back from there. My answer is *not* the same as the one given in Chapter

3 (to which I will return in a moment). My answer would be: complexity theory, as exemplified in this book, is mainly positivist and structuralist. It sometimes plays with critical modernist tropes, but it never pursues them very systematically or very far.

Complexity theory, in my view, is *positivist* because, for the most part, it claims to be uncovering the reality of the modern world of governance—namely, a highly complex and dynamic reality in which governments can no longer ‘control’ or even ‘steer’ by themselves, and in which even the best-laid plans are frequently interrupted by unforeseen conjunctures and surprises. This, it seems to me, is by far the most obvious way of reading the first chapter of this book, and the majority of other chapters, although not all of them. I am therefore disagreeing with the claim in Chapter 3 that the majority of authors in the book “lean close to a strand of critical realism”. They may wish to do so, but in a number of chapters I do not find much evidence on the surface of the text that critical realism is being systematically practiced (see more detailed comments in the following on the nature of critical realism).

Complexity theory is also positivist by association, because of its strong roots in the hard sciences of biology and physics. Complexity theory is structuralist because it lays the greatest emphasis on ‘systems’ and ‘systemic interactions’ and ‘evolution’. Systems are concepts in which the whole is greater than the sum of the parts (and ‘agents’ are often only small parts). This is borne out by the methodological discussion in Chapter 3 which focuses on patterns and says next to nothing about the nature of agents or agency. Further, evolution is a process in which the individual agent actually does not matter very much—far more important are selection mechanisms and environmental challenges. This has been made very clear by (*inter alia*) the leading evolutionary theorist to apply this perspective to the public sector—Kaufman. Kaufman argues that actors regularly deceive themselves about the extent of their influence over events—that the ‘laws of chance’ explain the survival of particular organizations rather than far-sighted leadership (Kaufman, 1991: 67–72).

I would like to dwell for a few moments on *evolutionary theory*—although I acknowledge that that is only one element within this book. Although superficially appealing (and benefiting by association from some of the scientific status ascribed to biological theories) the evolutionary perspective is infested with problems and analogical pitfalls. To begin with, what are the ‘species’ in this evolution? How should organizations be divided up into species, if indeed the organization is the basic unit for analysis? If ‘systems’ are the species unit, how can they be defined and counted (the book contains not a single example of such counting—and neither do most texts which use systems approaches)? And how can notions of replication be applied when organizations (or systems) are constantly changing their own forms, merging and splitting with other organizations, often of different sizes and types? It looks as though, in the

world of organizations (or systems), interspecies breeding is rather common and, what's more, a particular individual can re-engineer itself into another species (local hospital into multinational, multiservice healthcare corporation, for example) by an act of will. This is hardly the natural world as we (or Darwin) know/knew it. The very definitions of 'birth' and 'death' are problematic—when a ministry is renamed, divided and downsized, is that a new life or a transformed continuation of the old? Equally, do systems 'die' or do they just 'evolve'?

Furthermore, the knowledge and competence acquired by one organization can be transmitted to other organizations at any time and by a variety of means—there is no need for organizational mating and reproduction, or at least not in any formal and obvious way. An additional pitfall is the sometimes-made assumption that, in the interaction with its environment, it is the organization that has to do all the adapting. This seems to fly in the face of the evidence that some large organizations (Microsoft, the Pentagon, the Ministry of this or that) have the capacity significantly to remodel their own environments. Political scientists have long ago noticed that one of the abilities which governments possess to an unusual degree is the power to alter the rules of the game—by legislation, the exertion of coercive force or by other means. It is as though the tiger can remodel the jungle. All this stretches the biological analogy to breaking point (see Crouch, 2005: 60–61).

Nevertheless, there is something of interest here—especially in the notion that certain phenomena are best explained by examining entire populations of organizations (or of a given type of organization) over time (rather than, say, by case studies, histories or sampling). Disappointingly, most evolutionary theorists seem to have given only limited attention to the concept of time itself. Their theories need it—the processes of replication and interaction take place over time, and much hangs on just how long these processes might take—and yet there is very limited direct discussion of this.

Kaufman is perhaps the 'evolutionist' who offers the clearest and most radical statement of the position. As indicated earlier, he argues that leadership and strategies do not actually seem to have much effect on the overall population of organizations. These intentional 'inputs' are not the most convincing way of explaining the pattern of organizational births and deaths. Instead Kaufman posits an impersonal and partly random set of mechanisms, operating within an overall context that is subject to historical development towards greater complexity and interdependence (or, to put it another way, more and more organizations). Kaufman expresses this last idea as the proposition that "the medium out of which organizations form becomes thicker" (Kaufman, 1991: 143). He finds the evolutionary analogy, and much evolutionary vocabulary extremely useful ('variation and natural selection among organizations'), but he is careful to distinguish his approach from sociobiology and to remind us that he is dealing with organizations, not organisms.



Kaufman's basic explanation for organizational mortality is that 'their engines stop' and their engines stop 'usually because they develop resource problems'. They develop these problems "because their environment is volatile and adjusting to it is not easy" (33). However, a few organizations (especially public sector organizations, according to Kaufman) nevertheless survive for a long time. Their triumphs, however, are probably not the product of intelligent foresight by skilful leaders, but more likely just chance (67–72). But this does not inhibit retrospective rationalisation:

The leaders and members of surviving organizations are usually disposed to attribute the endurance of their organizations to their personal virtues and gifts rather than to the laws of chance. (Kaufman, 1991: 69)

This illusion (if it is such) is not only fostered by organizational members but also, nowadays, by the growing army of management experts and gurus, who devote a lot of energy to distinguishing precisely those strategies and qualities which are supposed to guarantee organizational success.

Kaufman recognises that organizations exist in an increasingly complex environment—and that much of the complexity arises from the existence of more and more other organizations, with which interactions take place. He sees this as a kind of thickening of a growth medium—a scene in which organizations swim in a denser and denser sea of 'stuff'. This is fascinating, but it poses great difficulties for the empirical researcher. Studying one or two organizations is difficult enough, but studying whole populations of organizations is a formidable undertaking. Kaufman himself recognises this with stark clarity:

it would be folly to claim that the medium in which organizations form grows thicker everywhere and constantly. Like other natural processes, this one is not uniform or steady.

That means that the index must be the average thickness of the medium globally; otherwise there is no way to test the hypothesis . . .

Obviously, measuring the thickness of the medium on a global scale would be a monumental task . . . Conducting the test would clearly require great ingenuity, resolve, perseverance, patience and money. (Kaufman, 1991: 143–144)

Ingenuity, resolve (etc.), one might add, which are as absent today as they were in 1991. However, perhaps Kaufman's aims were just too high. There seems no reason why the concepts and methods of the evolutionary approach should not be applied to some more doable subset of organizations, always provided that a defensible definition of the relevant 'species' or group can be established so as to delimit the territory. Indeed, this is exactly what many organization population theorists have done. The problem for our present

purposes, however, is that the group or territory has usually been defined in terms of firms operating in markets (e.g. Dobrev and Kim, 2006). These categories are very hard to translate to public sector contexts. There are, however, some studies that are pitched at a more abstract level, and which arrive at interesting conclusions that are potentially relevant for the public sector. One recent example would be Ethiraj and Levinthal's computer modeling of processes of organizational design (2004). They conclude that attempts to fundamentally redesign organizational architectures in order to adapt to environmental change are more likely to succeed in organizations with strong hierarchies—"hierarchy was shown to be a necessary and sufficient condition for the success of design efforts" (430). Such architectural adaptations yielded definite benefits when rates of environmental change were low or modest, but "when the rate of environmental change is high, adaptation does not yield survival benefits" (ibid.: 431). These findings therefore remind us that speed and timing are often crucial. How quickly can organizations be reshaped *relative to* the rate of change of the key environmental influences?

There *is* something refreshingly different about evolutionary approaches. The soap opera of who said what to whom and why this decision or that was taken retreats into the background (or disappears altogether). What remains is a set of impersonal processes working themselves out over extended periods of time and on a large scale. In this sense an evolutionary perspective can act as a highly valuable corrective to a closer focus on daily or weekly events. It is not at all like traditional history, glorying in the particular and the circumstantial, but is rather more Olympian and fatalistic—'this is the way things go'.

On the other hand, it is probably not a coincidence that we have rather few evolutionary studies to call on. This is partly because there are considerable conceptual and practical problems in setting the evolutionary model up. The conceptual problems have already been alluded to. The practical problems are, in brief, the need to assemble a suitable data set for the selected population of organizations over a relevant time period. The wider the population about which one wishes to generalise the more investigatory resources one will need. What should this population be: university hospitals? All the public hospitals in one country? Public sector organizations in general in that country? Public organizations in the 'advanced' countries as a set? The further one goes down this road the less likely one is to be able to construct a reliable database, and the greater the effort will be expended in trying. But if one goes only a short distance, the scope for generalisation will be correspondingly small (and much smaller than some of the generalisations frequently advanced by complexity theorists).

Now I leave evolutionary theory and return to the basic epistemological identity of complexity theory. On the basis of most of the forgoing chapters I would also conclude—despite the claim in Chapter 3 alluded to earlier—that complexity theory is not usually or convincingly *critical modernist*. I

am well aware that this is a controversial suggestion, and I accept that this is one of the most contestable parts of my analysis. In practice, however, I find only limited evidence that this epistemological aspiration has been achieved. For the most part the chapters read like positivist accounts, and the elements of critical realism and, even more, social constructivism are in the background, and are rather underdeveloped. I will make just two points about this, although much more could be said.

First, in relation to critical realism, there is here a serious shortage in the identification and analysis of causal mechanisms, despite the fact that these are central to the critical realist model of explanation (Pawson and Tilley, 1997: 65–69). Few of the case studies formally identify and trace out such mechanisms.

Second, there are some equally serious points in relation to social constructivism and critical modernism. Giddens, who is cited with approval in these pages, has certainly been a major commentator on the nature of modernity. According to him (and other critical modernists) ‘reflexivity’ is one of the major characteristics of late modernity (Giddens, 1991: 36–45). Concepts are not just ways of describing an external reality, they ‘actively constitute’ individual and social behaviour (*ibid.*: 41). Going further, some critical modernist social theorists (including commentators on Giddens) have called for work which “examines the institutional presuppositions of its own standpoint” (Loyal, 2003: 127). According to this line of argument scholars (and practitioners) in areas of specific expertise should routinely reflect on the assumptions and conceptualizations of their own work. However, when we place the chapters of this book under the glass we find that few of these chapters contain any extensive reflection on the questions of why complexity theory should be making its appearance just now, which groups in academia have an interest in its development, where they are situated institutionally or how it relates to the business of governance and consultancy. In short, there is only very limited reflexivity about the emergence of complexity theory itself—no ‘anthropology’ of the complexity theory community and no rhetorical analysis of the community of complexity discourse. (For an account of this kind that deals with managerialism in general, see Pollitt, 1990, or for New Public Management ideas in particular, see Pollitt, 2007. A broad-scope account of the spread of modern management ideas can be found in Sahlin-Andersson and Engwall, 2002.)

My argument here—that the critical, postpositivist gloss on complexity theory is only skin-deep—can be further explored by considering one of the strongest postpositivist claims made within this book. That is the claim that:

As argued in Chapters 1, 3 and 7, system boundaries do not exist a priori. What constitutes a system is a matter of judgment by the actors comprising the system as well as by observers. This means that depending on what one wants to know, the systems and their boundaries are defined

by the analytical questions of the observers. In other words, boundaries and systems are not given, but dependent on the focus of attention: the system and its boundaries in one scenario may be nested systems in another, or vice versa. (Chapter 8—and this claim is echoed elsewhere)

At first sight this seems like a typical piece of social constructivism—systems are what we conceive them to be; they may well have real effects, but only after we have built up some intersubjectively agreed concept (however fragile and vague) of what they are. So far, so good, but we also need to examine how this insight is actually used, and how it relates to other aspects of complexity theory. Thus, if we follow the constructivist logic, the basic distinctions used within the book itself (such as the distinctions between physical, social and policy-making systems in Chapter 8) are themselves social constructions. We do not know how far these academic constructs are shared by the various actors in the policy-making process. The latter may have entirely different (and possibly multifarious and clashing) views of what the relevant systems are, and where their boundaries lie (precisely this diversity is stressed in Chapter 7 on traffic management). But these possibilities have only a marginal presence in the case studies of Chapters 5, 6 or 8. The reader is given little or no direct or systematic evidence about what ‘rival’ conceptualizations of systems there may have been, or how these alternative conceptualizations may have influenced the course of events. There are a few general statements about what positions different groups represented in the lobbying and bargaining processes, but nothing more systematic. Further—and this is perhaps more serious—full acceptance of the socially constructed nature of systems would render the big generalisations referred to earlier (concerning the nature of public management, the ubiquity of coevolution, etc.) far less impressive. They would become either speculative claims, or self-definitional truths, not the strong empirical claims they at first appear to be. In short, complexity theorists cannot have it both ways. They cannot claim to be uncovering deep and enduring truths about the general conditions of contemporary society and governance (positivism) whilst at the same time holding that their own basic concepts are socially constructed by particular academic groups for particular purposes at a particular point in the development of western social science. They cannot comfortably sit on the fence as “neither fully positivist nor fully postpositivist” as Chapter 3 claims they do.

None of this is to claim that generalisation is impossible or, indeed, that objective realities do not exist (here, at least, I can agree with Chapter 3). As Pawson and Tilley (1997: 23) say, the social world “consists of the more than the sum of people’s beliefs, hopes and expectations”, important though all these ‘constructions’ are to the end of understanding and explanation. It is simply to suggest that useful explanations need to include mechanisms which connect macro- and micro-processes and, by doing so, reflect the specific, many-layered social contexts in which decisions and actions occur (Pawson

and Tilley, 1997; Chapter 3 of this volume). Instead of parachuting complexity concepts onto the case study narratives, it would be useful to know exactly what conceptualizations of the various situations were held by each of the key actors in each case study, and how these conceptualizations influenced their decision-making. It would also be useful to know what mechanisms connected—for example—national political systems, local governments, big business, environmental groups and so on. Some of the chapters of this book do make reasonable progress with this task, but others get hung up on broad concepts and fail to specify the necessary mechanisms to generate real explanations. The general absence of self-reflection on the beliefs, agenda and organization of complexity theory itself is a persistent concern.

Let me again acknowledge that my forgoing interpretation is much ‘harder’ and narrower than the one offered in Chapter 3. There we find a sophisticated and extensive argument to the effect that complexity theory has variants in the positivistic or postpositivistic camps. To me, however, this is (to use a colloquial English phrase) ‘trying to have your cake *and* eat it’. If complexity theory really exists in all these forms then it is not one theory at all (it could not be—see Pawson and Tilley, 1997; Chapter 1 of this volume; Yanow and Schwartz-Shea, 2005). Rather, like path-dependency (which is not a theory either), complexity ‘theory’ may actually be a bunch of descriptive concepts in search of a theory, able to lend itself to a range of alternative theoretical ‘stuffings’ (Kay, 2005; Pollitt, 2008; Chapters 2 and 3 of this volume). If this is the case then it might explain why there are so few clear and testable propositions—complexity ‘theory’ is actually a set of descriptive categories, not an engine for generating explanations. Indeed, this possibility—that there are different theories using similarly labelled concepts and parading under the one umbrella title—is honestly acknowledged in various chapters. Chapter 3 takes this further with its depiction of general complexity theory (general rules) and situational complexity theory (contextual explanations). Unfortunately, this leaves the reader with a vague sense that there are two different versions (apparently with some quite fundamental epistemological variations) but not much more. Chapter 3 claims that the two can be combined, but this claim is not worked out in any detail, and seems epistemologically unlikely. Clearly there is much work still to be done here.

In other works by complexity theorists, a more singular and definite epistemological position is taken. For example, in Stacey et al.’s (2000) *Complexity and management* it is claimed that the essence of the theory is a ‘transformative teleology’. It warns that complexity concepts should not be imported to other kinds of theories of organizational change (precisely what I will later argue is one of the more promising ways forward—and something which is done rather successfully in some chapters of the present book). It states that:

For us, the complexity sciences are a source domain of abstract relationships from which we believe it is possible to derive insights about human interaction by way of analogy. (Stacey et al., 2000: 191)

Abstract this way of thinking about complexity certainly is! Consider this description of the transformative teleology:

[It] is not subordinate to the formal causal process of self-organization but is an overarching causality in which the “purpose” is the continuity and transformation of identity, and thus difference. (Stacey et al., 2000: 37)

If this is teleological purity, I have to confess that I much prefer the ‘messier’, hybrid epistemology of the present book. Much of Stacey et al.’s account, including the immediately preceding quotation, verges on the meaningless, or, at the very least, seems impossible to apply in any productive way to the study of public administration and governance.

Finally, I would note one unfortunate tendency which some of the chapters in this book share with many other writers who are advancing (purportedly) new theories and concepts. That is the tendency to set up a ‘paper tiger’ opposing theory, measured against which the new theory (here complexity theory) is obviously superior. In the case of this book the paper tigers are academic accounts which take an exclusively hierarchical and centralist viewpoint, which are static rather than dynamic, which refuse to acknowledge the extent and importance of chance events and coincidences, and which assume that all change comes from outside, not from self-organization. If someone read this book alone, and no other works on public administration and public policy, they could be forgiven for thinking that an awful lot of the relevant academic literature shared the forgoing faults and weaknesses. In my view, however, that picture simply is not accurate. There are many theories and approaches which are non-hierarchical, dynamic, acknowledge the significance of endogenous as well as exogenous change and so on. If we look through the works of the contemporary ‘big names’ in public administration and public policy (for example, Bovens, Dunleavy, Hood, Kettl, Kingdon, Lynn Jr., Moran, Olsen, Peters, Rainey, Rhodes, Sabatier) we find very few exemplifications of these weaknesses, although none of these authors are complexity theorists. My view is simple—complexity theorists should stand on their own two feet, epistemologically speaking, and should not need to invent or magnify paper tigers in order to enhance the value of their own perspective.

### 12.3 HOW DOES ONE ‘DO’ COMPLEXITY THEORY—WHAT ARE ITS METHODS?

Here I will follow a fairly traditional distinction between ‘theory’ and ‘methods’ (where ‘theory’ has been dealt with in the previous subsection). Readers should note that this is not quite the same nomenclature as is used in Chapter 3, where most of the references are to ‘methodology’, which

appears to be used in a way that to a degree merges theory and methods. I prefer not to do that, because I believe that different theories can often (but certainly not always) employ the same methods, and that those methods need to be assessed in their own right, in terms of what they can and cannot be expected to contribute to the different theoretical endeavours.

Case studies, we are told, are currently the key. Then “general patterns are derived from a comparison of cases” (Chapter 3). At first this sounds reasonable. But further thought raises doubts as to the adequacy of this as a methodology. According to recent methodological scholarship case studies can perform various very useful functions (Blatter and Blume, 2007; Gerring, 2007). They can be used to test theoretical propositions by focusing on the congruence or incongruence of actual observations with theoretical predictions. They can be used to generate new theoretical propositions, for testing on a larger scale. They can serve as a way of tracing causal processes and mechanisms (something I would like to have seen more of in these chapters). But they cannot, by themselves, give information about the frequency and distribution of phenomena across a population of contexts or domains (a vital aspect of any ‘evolutionary’ approach). Thus it is questionable whether even a substantial number of individual case studies can convincingly be used to derive general patterns. This is doubly so when the cases have been carried out on different bases using different methods and data collection categories, as is clearly what has happened with the set brought together within these covers. Nor can a set of such cases provide an adequate foundation for claims that particular elements (such as self-organization or the incidence of non-linearities) are becoming more common and prominent in governance generally (or even in governance in one country). For these claims some kind of survey or macro-scale investigation would be required (Gerring, 2007: 27–36). Furthermore, the survey would have to be able to isolate and count the numbers of relevant systems, of various types, and the numbers of examples of coevolution, self organization and so on, as a proportion of all systems or cases. Operationally this would be a major challenge (for example, both ‘system’ and ‘governance’ are notoriously abstract and hard-to-operationalize concepts). This kind of research would therefore be extremely difficult (and costly) to undertake, and it is hardly surprising that, neither in this book nor in most of the other complexity literature that I have been able to examine, has any such analysis been undertaken. Without it, though, we cannot reliably and objectively assess such propositions as that the policy-making world has become more complex, or that non-linearities are increasingly frequent. We may be able to show that many policymakers *think* that these things are so (although that is not attempted here either) but that is another matter entirely, and may reflect no more than a fashionable and ephemeral discourse—in Pawson and Tilley’s realist terms a part of reality, but only part, and not necessarily the most important part.



So there are limits to what case studies can do, but there are also prerequisites if case studies are to achieve their full potential. One of the main prerequisites concerns the focal research question:

It is impossible to pose questions of research design until one has at least a general idea of what one's research question is. There is no such thing as case selection or case analysis in the abstract. A research design must have a purpose, and that purpose is defined by the inference that it is intended to demonstrate or prove. (Gerring, 2007: 71)

Not all the case studies in this book have a clear research question, defined by a particular inference or set of inferences. Some seem intended mainly to demonstrate the usefulness of complexity concepts—but while that is a *purpose*, it is not yet a research *question*.

I now come back to evolutionary theory. Both I and the other authors of the book have referred to the work of Herbert Kaufman. Kaufman was, *inter alia*, the author of a famous book using evolutionary theory entitled *Are government organizations immortal?* (Kaufman, 1976). In that work he came to the conclusion that federal government organizations in the US did indeed typically enjoy exceptionally long lives—much longer than private sector organizations over a comparable period. Some years later two public administration professors decided to go back over Kaufman's calculations to see if they agreed with his methods and conclusions (Peters and Hogwood, 1988). They didn't agree, and the nature of their analysis helps to illustrate further both the strength and the weaknesses of evolutionary methods when applied to public sector organizations.

Whilst acknowledging the potential of the evolutionary/ecological approach, Peters and Hogwood pointed to a number of questionable aspects in Kaufman's original method. These illustrate some of the methodological problems of the evolutionary approach in practice. To begin with, the way births and deaths are counted is far from straightforward, and, in this case, Kaufman significantly underestimated their totals. Kaufman had looked at the organizations that existed in 1923 and then tried to ascertain how many of them still existed in 1973. Therefore his method could not take any account of organizations which had been invented *after* 1923 but had disappeared *before* 1973. Equally, it ignored organizations created after 1923 which still existed in 1973. Given that this intermediate period included a stretch of frenetic organizational creation (Roosevelt's 'New Deal'), this was a serious omission (sometimes called 'middle censorship'). Many of these New Deal organizations had, in fact, disappeared by 1973. A second flaw was that a strict focus on births and deaths misses the point that much organizational change in the public sector can be conceptualized as *succession*, rather than birth or death—that is, a given organization is minimally, partially or fundamentally reorganized into something substantially



different—self-organization, as complexity theorists would call it. Peters and Hogwood found an enormous amount of this kind of change, implying that the degree of organizational instability in the US federal sector was far higher than Kaufman’s original account suggested. In addition, Kaufman’s results depended very much on the level at which ‘organizations’ were defined. Cabinet departments may well change only slowly, but if one looks at a lower level, subordinate offices, bureaus and committees may change much more rapidly. Finally, there was the fact that Kaufman’s sample had included only 10 executive departments. This excluded both the huge Department of Defense and many, many other kinds of federal organizations (in 1983 only 45 per cent of federal organizations were in executive departments). Peters and Hogwood conclude that “there has been a great deal of change in government over the fifty year period we investigated” and that “[w]hile dramatic termination or initiation events are certainly important, the modal change in government is actually the transformation of an existing organization and probably an existing policy as well” (Peters and Hogwood, 1988: 131). What is significant here is that this instability long predated the kinds of complexity that are supposed to have derived from ‘late modern’ and ‘postmodern’ conditions of globalization, declining public trust, fractured political identities and so on. Furthermore, it is apparent that researching evolution in a systematic and serious way entails many difficult decisions on methods and categories—decisions which, depending on how they are taken, may have large effects on the eventual findings and conclusions.

#### 12.4 WHAT IS THE ADDED VALUE OF COMPLEXITY THEORY?

This is a key question, but of course it needs to be asked with relation to some genuine alternatives. So one must choose which theories to compare complexity theory with. Here I choose two broad families: political science theories of bargaining and negotiation (neo-pluralism and neo-corporatism) and organizational theories.

The chapters in this book differ considerably in terms of what they are trying to achieve, and what they do achieve. Overall, however, I did not see that the added *explanatory* value attributable to complexity theory was very high. Take Chapter 5, for example. Much of the chapter was taken up with establishing an elaborate taxonomy of concepts relevant to the idea of a change event. Then short narratives of recent developments at the ports of Rotterdam and Hamburg were provided. Finally these narratives were ‘fitted’ to the conceptual taxonomy. While there was nothing wrong with this, and while the points about the varying degrees of intentionality and so on were well organized, the treatment did not furnish any real explanation at all. Conventional narratives were fitted to a conceptual scheme—that is not an explanation. Neither is the implicit claim that ‘change events’ are

a new discovery or a sustainable one. From traditional history onwards, ideas of sudden pivotal moments have been fairly widespread. Recently, for example, they have formed a core element in policy studies that utilize models of ‘punctuated equilibria’, although the theoretical apparatus deployed by such theorists as, for example, Baumgartner and Jones, is far from that proposed by complexity theorists (Baumgartner and Jones, 1993, 2002; Pollitt, 2008; Chapters 2 and 3 of this volume).

What was missing—in this chapter and others—was an identification and elaboration of specific *causal* processes or mechanisms. Compare this with, say, a classic pluralist or neo-corporatist account of the same events. In these traditional political science approaches all the main actors at each time period would be identified, as would their strategies, interests and the power resources they brought to the table (money, expertise, legitimacy, etc.). Incidentally, the treatment of *power*—or the lack of it—has long been recognised as a weakness in systems approaches (see Martin, 1977: 19). The unexpected events would be treated as just that—unexpected events, to which the actors reacted with more or less power and influence, and more or less skill and insight. Such an account would, I suggest, be no less fruitful or comprehensive than the account provided in Chapter 5. It would also contain specific explanatory propositions. Yet it would use none of the special complexity theory concepts. So, we must ask, what is it that complexity theory adds? Certainly not the ideas of dynamism, or of unforeseen events, because both these are fully present in more traditional accounts.

Another tendency found among complexity theorists (but they are certainly not the only guilty ones!) is to claim as new some concept or insight which has in fact been arrived at previously by researchers working in one or more quite different theoretical traditions. There were several examples of this scattered through this book, but I will choose only one here. It is the claim that the concept of self-organization captures something hitherto not seen about the capacity of organizations and systems to change endogenously (from the inside). When the history of the development of public administration literature is reviewed this claim cannot be sustained. Many key scholars have discussed endogenous change (even if they have used somewhat different terminology). Recently, for example, Kelman has produced a book, *Unleashing change*, which analyzes the processes of endogenous change in a set of US federal government organizations using conventional organizational theories and social psychology. By doing so Kelman achieves a much more detailed analysis, replete with specific, testable (and tested) propositions, than anything I have yet seen in complexity theory (Kelman, 2005).

Despite this paucity of causal/explanatory analysis, complexity theory does add value by identifying certain patterns of behaviour or outcomes which evidently occur in a variety of circumstances. Thus, for example, Chapter 5 identifies a pattern in which the authors observe that “attempts to control a process can easily lead to the opposite effects that those

intended". Or Chapter 6 finds a pattern of two types of system response to uncertainty—first, autopoietic self-organization and, second, dissipative self-organization. Chapter 11 finds not one but a variety of patterns in the relationship between trust and control, and identifies initial conditions as an important predictor of which path is likely to be chosen.

This 'pattern recognition' is valuable, yet some modesty is called for in its presentation. Complexity theory is here following, not leading, an established social science tradition of searching for dynamic patterns over time. Many previous theorists have attempted to isolate such patterns, and the last 10 to 15 years have witnessed a considerable and sophisticated debate about what these patterns might be, and what kinds of processes lie behind them (e.g. Crouch, 2005; Pollitt, 2008; Streeck and Thelen, 2005). The present collection of case studies certainly contains some interesting patterns, but without more research—and research of a different, non-case study type—we cannot know how widely distributed these patterns may be, or what typical preconditions tend to generate one pattern rather than another. Thus to say, for example, that policy failure can sometimes sow the seeds for success the next time round is interesting, but it does not take you very far unless it can also be specified under what conditions failure improves the chances of success in the next round, and under what conditions it may actually make future success even more elusive.

## 12.5 CONCLUSIONS

I have been very critical of the claims of complexity theory and evolutionary theory advanced between these covers. That is not to say they have no worth. It is certainly not to deny that they may yet develop into something with much greater explanatory value added than has yet been demonstrated. For the present, however, I would describe these theories as mainly 'useful reminders' and 'promising conceptual tools that can perhaps be used within more orthodox theoretical approaches' (as is advocated in Chapter 2 and is practiced, for example, in Chapter 11). Complexity theory reminds us of the (probable) nature of certain key elements of the general backdrop of contemporary public administration. These are, principally, multiple and unpredictable interactions between many different kinds of organizations, combined with high-impact events (such as floods, new diseases, technological disasters), all of which can lead to 'non-linearities'. Evolutionary theory reminds us that certain phenomena may only become visible if one takes a long-term, population-focused approach. Taken together these perspectives certainly render approaches which rely exclusively on studies of formal government policy-making inadequate in themselves—although, as indicated earlier, recognition of this weakness is found in several theoretical approaches, not exclusively in complexity theory.

However, these elements do not yet amount to a *theory* of complexity in public administration, in the sense of a propositional explanation of actions and outcomes. (Evolutionary theory is rather different here, because, at least in certain forms, it does offer specific propositions and explanations.) The ideas of complexity theory function more as a descriptive conceptualization of the backdrop to action (and one which, at times, seems very wordy and taxonomically overelaborate). I recognise that this book pushes a little beyond that, but not very far. The elements developed here need careful testing in any particular application/context. Not all sectors, policies and issues are likely to be characterized by this combination of volatile elements. Indeed, some areas of public policy and management are remarkably stable and predictable. Hectic change can exist alongside long-term continuity, sometimes inside the same government. As the book itself acknowledges, what we have here is a collection of cases studies from one main sector (infrastructural planning) and mainly from one country (the Netherlands—with a little additional material from a couple of other countries).

## 12.6 LOOKING TO THE FUTURE

Given this sceptical assessment, in what directions could complexity theory be developed in the future? I would make five suggestions, each of which is based on the forgoing evaluation.

First, *clarify and focus the epistemological basis of the theory*. At present complexity theory appears to lack epistemological unity and clarity. It tries to be all things to all men—a bit of positivism, a bit of postpositivist critical realism and a bit of social constructivism. I find this confusing rather than helpful: of course, focusing on a more singular set of epistemological commitments would be painful, insofar as it would probably mean dropping certain claims and perhaps losing some adherents. But I suggest that the focal gains in the medium term would outweigh these losses.

Second, *work towards developing a set of testable, specific propositions directly derived from the theory*. This can only be satisfactorily accomplished after the first step of clarifying what sort of theory it is, epistemologically speaking. The types of propositions one can make depend on the underlying epistemological foundations. At present the balance within complexity writings between, on the one hand, elaborating conceptual taxonomies and, on the other, developing specific propositions, is heavily weighted towards the former. If the core of complexity theory is to lie in late modern critical realism, then some of these propositions should concern the operation of mechanisms linking specific micro-features to the multilayered contexts.

Third, *explore the added value of complexity theory by applying it comparatively, alongside other types of theory, to the same questions and*

*topics*. It would be important here not to choose ‘paper tiger’ rival theories, but to choose strong ones—as, for example, my colleagues and I tried to do when explaining agency development in four countries (see Pollitt et al., 2004: final chapter). Such an exercise would clarify exactly what novelty and extra insights complexity theory brings to the table.

Fourth, in contrast with the third suggestion, *apply selected complexity concepts in explicit combination with other bodies of theory, so as to investigate what they can contribute in a theoretical partnership*. We saw some of the fruits of this approach in Chapter 11, where one of the key complexity concepts—coevolution—was carefully combined with existing theories on trust and control. But much more of this could be done and, I suspect, it would reveal that one of the chief values of certain complexity concepts lies in their *combined* use with other theoretical perspectives. Paradoxically this can more easily be achieved when the epistemological ambiguities referred to in the first recommendation are clarified.

Fifth, and finally, *explore more fully methodologies beyond that of case studies*. There is nothing at all wrong with case studies, but it is quite clear that, in order to investigate some of the broader concepts of complexity theorists, more survey-type and other macro-methods are required. Kaufman saw this very plainly, but it remains true today that little such research appears to have been done.

I conclude as I began, by acknowledging the openness of the authors to hearing my (no doubt often unwelcome) views. This book has developed a good deal as it has gone through the various stages of drafting, and I feel privileged to have been part of this creative and truly ‘emergent’ process.

# 13 Towards an Approach of Evolutionary Public Management

*Frank Boons, Arwin van Buuren, Lasse Gerrits, Geert R. Teisman*

## 13.1 GOVERNANCE IS A PROCESS SYSTEM

Governance processes such as decision-making on urban renewal, water system investments and infrastructure projects are causes of concern for public officials and an important object of research for scholars in the field of public administration. Although there have been many accounts of problematic decision-making processes and implementation, it is still difficult to understand what the causes of problems such as delays, obstruction, cost overruns and dissatisfaction about the results are.

One thing is clear: there seems to be no such thing as an ultimate cause for process disturbance. In addition, the causes that are indicated, such as unclear goals, a lack of control, and resistance by opponents, seem to be resistant against attempts to control them. Many striking examples for this discrepancy between expectations at the beginning of a process and the actual output and outcomes can be found in this book as well as elsewhere in the literature. However, why is it that public officials and managers have so many difficulties with controlling the processes they initiate? This book begins from the idea that management in governance processes is often based on an insufficient understanding of the exogenous factors that shape governance processes.

In order to increase our understanding of this issue, a complexity theory framework has been applied in this book. Since its introduction into the realm of the economic and social sciences (cf. Arthur, 1990; Byrne, 1998; Stacey, 2003; McKelvey, 1999; Richardson, 2005), complexity theory has already found a few applications in public management, mainly in order to understand the dynamics of (public) decision-making (cf. Kaufman, 1991; Allen, 1997; Haynes, 1999; Morçül, 2003; Teisman, 2005; Gerrits, 2008; Dennard et al., 2008). This book is an attempt to further develop and refine complexity theory for application in the domain of public governance.

Governance processes are the coordinated actions of public and private actors around collective issues. The term 'governance' emphasizes the idea that there is often no single government organization in charge of a specific collective issue. A lot of research has been conducted on the mechanisms

that coordinate the actions of a variety of governance agencies (Williamson, 1996). This research mainly focuses on the structures and rules guiding the behaviour of agents, which has given us some ideas about how steering mechanisms like markets, networks and hierarchy—as the three mechanisms elaborated upon most—structure the behaviour of agents.

The approach in this book, however, acknowledges that coordination is not a designed and stable mechanism but much more of an evolving process because of the dynamic interactions between self-organizing participants in governance processes, management interventions and unmanageable internal and external dynamics. Governance is a process that takes place within a variety of hierarchies, markets and networks. It therefore is not guided in a stable and clear way by any one of these classical mechanisms. It is even difficult to make clear judgments about the boundaries of any governance process. This way of looking at governance processes may provide clues as to why it is so difficult to control processes in the public domain. It is not a failure on the part of the authorities, but has much more to do with the compounded character of the process itself that makes it only partially controllable. The authorities can only work to adjust themselves to the many and multiple process dynamics.

The approach to governance in this book is a systemic one. The term ‘system’ is somewhat confusing. As Pollitt has already indicated in the previous chapter, a system analysis is often expected to focus on general system characteristics that explain process outcomes. This is, however, not the aim of the process system approach in this book. Process systems are complex adaptive systems (see e.g. Teisman and Klijn, 2008). A system is not a stable structure or mechanism that exists outside of people’s perceptions in which a process is embedded that guides the outcome. It is the emerging interactions between the elements of the system that generate the outcome of governance processes.

The boundaries of process systems are not only permeable, they are also dynamic in the sense that they differ at different times and places and they are subjective in the sense that each actor in process systems has his own perception of what the process system constitutes. The evolutionary approach to governance increases our understanding of this living process system and therefore helps public managers to behave in a more effective way within these systems. Public managers can and have to influence a system they cannot control. A first step towards effective behaviour is to really understand this appealing paradox.

This final chapter wraps up the results found in this book. First, we summarize the findings on non-linear dynamics, self-organization and coevolution. Governance processes appear erratic and non-linear; stability and predictability are an exception within these processes. Secondly, the findings of the book lead to the concept of process systems. This has been elaborated upon in this book. Thirdly, we synthesize the implications of an evolutionary approach for public management and managers who operate in complex governance process systems.

## 13.2 THREE CONCEPTS REVISITED: NON-LINEAR DYNAMICS, SELF-ORGANIZATION AND COEVOLUTION

Non-linear dynamics, self-organization and coevolution are the central concepts in the evolutionary approach presented in this book. Policy processes very often appear erratic, and this is usually due to the occurrence of change events, the multiplicity of context and the behaviour of actors who self-organize rather than subject themselves to superimposed rules. Self-organization indicates the ability of (elements of) systems to behave in a self-chosen way and to resist externally induced change. Coevolution indicates that processes evolve from the way in which events and actions become intertwined and points to the coercive influence (unintended, unforeseen) that processes can have on one another. Together, the three concepts generate a convincing falsification of the idea that governance processes are stable and that deviation from this stability is 'abnormal'.

### 13.2.1 Non-linear Dynamics and Change Events

Many scientists often focus on the stable element of their research object. They attempt to find causal relationships and the control parameter that supposedly controls the outcome. Advances in the social sciences have shown that there are not many (or even no) relations that remain consistently stable over time and place. Consequently, attention is shifting towards the dynamics of governance processes. However, the majority of public administration studies focusing on dynamics still attempt to locate the final cause of dynamics (see e.g. Sabatier and Jenkins-Smith, 1993; Baumgartner and Jones, 1993; Rose, 1976; Hogwood and Peters, 1983). This book goes one step further in the following ways:

1. Governance processes normally develop in dynamic ways that cannot be predicted from previous processes and/or from the initial conditions at the beginning of a process.
2. Due to self-organization within processes, the coevolution between processes, the occurrence of change events and interactions within a multiple and ever-changing context, non-linearity in processes and outcomes often occurs.
3. The desire for change may initiate governance processes ("There is a problem and I am going to solve it by making the following changes") and new processes and dynamics, but the initiator does not control the dynamics that occur after initiation. A specific governance initiative is just one manifestation of self-organizing capacity within societies.
4. Initiators of governance processes facing complex governance systems develop and apply simplified pictures of these systems, often overestimating their knowledge as well as their ability to change and control the system. Due to these limited boundary judgments, their actions often generate more non-linear dynamics.



The developments in the cases of railway upgrading or building and exploiting port areas (Chapters 4 and 5) demonstrate the non-linearity in processes and the variety of sources that cause non-linear development of these processes. In their search for change events, the researchers were confronted with intentions and actions of initiators in a specific policy process that were important sources for dynamics and intended change in the course of that process. However, at the same time, they also witnessed actions and events far away from the inner circle of a process that also had important impacts on what happened. The port authorities in Hamburg, for instance, were confronted with an estuary system that reacted in a non-linear and unfavourable way to their deepening strategy. Elections are another example of change events that not only create the changes that are desired by the electorate who chooses a new government, but also create important unintended non-linearity in governance processes. Often, these events generate delays, as in the case of the Betuweline. In other cases elections cause shifts in rules, personnel and budget, as in the case of the West Coast Main Line.

The search for change events has generated additional evidence that these events, even if they are of crucial significance to processes, do not have a direct and stable impact on how processes evolve. It is clear from the case studies that the response of the actors within a process system is an important mediating factor. This does not mean that the actors can decide to ignore external events in order to stabilize their processes. It does, however, mean that the effects of any event are clearly affected by the way in which actors in a process system do respond to that event and interpret it. The cases show that neglecting an event can be effective only to a certain point, which is often unknown before it occurs. If the impact goes beyond that unknown point, neglect can lead to considerable disturbance in terms of cost overruns and delays, as shown in the West Coast Main Line case. Such insights bear similarity with those from catastrophe theories: systems appear stable for a long time and seemingly resilient against large-scale interventions, but once an unknown threshold has been passed, the system shifts to a new state of equilibrium. The moment of change can often only be analyzed in hindsight. For example, the two cases on port extension bear some similarities but developed in very different ways. However, this does not mean that the physical system in the Westerschelde case could not shift, in the same way as the system in the Unterelbe case did, at some point in the future.

For public managers, the main issue is the fact that a certain system change cannot be known in advance. This means that such shifts occur unexpectedly, which is unpleasant if the change is unfavourable. It is therefore important to be prepared for the unknown.

### **13.2.2 Self-organization**

Self-organization is the second core concept discussed in this book. It refers to the ability of actors and organizations as well as larger systems

to maintain or change their structure and strategy by themselves, without external control (De Wolf and Holvoet, 2004) and to resist externally induced change. The idea that actors resist change is often perceived as a bad thing in the domain of public administration. For example, in the case of spatial planning, free market forces are often considered to be adverse to the well-being of public space. Alternatively, market-based instruments meant to organize self-guidance based upon market mechanisms have been lauded as a panacea in New Public Management without adequate consideration of their pitfalls.

Where self-organization has often been addressed in public administration theories as something that should be controlled by governments, this book places the concept at the very core of governance processes in the evolutionary approach. Guidance of these processes is distributed across the full set of actors and over different process systems, a fact that has provided the basis for network approaches to policy-making (cf. Kickert et al., 1997). While government actions may appear to be different from self-organization, they are in fact an additional dimension of it (Boons and Gerrits, 2008). Self-organization is thus omnipresent in governance, regardless of whether officials like it or not.

Many research accounts confirm this idea. While governments attempt to control implementation processes, the rate of non-compliance of the outcome of processes with the 'central' decision is enormous. Where scientists like Flyvbjerg and others (2003) tend to blame the decision and decision-makers for this gap, the approach in this book provides substantial evidence that the interactions between a variety of subsystems and processes is what causes the gap between an initial decision and 'its' results. It is questionable whether another type of decision could have bridged that gap. It is argued here that the gap is here to stay as long as the variety of initial decisions taken by a variety of actors do not become synchronized with one another and with the actions, events and processes in surrounding subsystems. This idea of synchronicity as an explanation for how processes develop, also utilized by Jaworski (1996), can help achieve an understanding of what the management of governance processes is about: coordination through self-organization. Self-organization as discussed in this book has four dimensions:

1. Self-organization is a driving force of governance processes that sheds light on why governmental steering ambitions often fail.
2. Self-organization causes processes to follow unexpected trajectories. Self-organization stems from the free choices of people in charge often oriented at maintaining their position and stability, but occasionally oriented at change and adjustment to new demands or circumstances.
3. Self-organization can and often will be driven by the ambition or need to survive (often this is called self-interest; we use the complexity theoretical term autopoietic or conservative self-organization), but

also by the ambition to contribute to and have an impact on a larger system (often this is called public interest; we use the term adaptive or dissipative self-organization).

4. Self-organization is closely related to the boundary judgments regarding the system as defined by the actors in a certain case. Boundary judgments that are based on partial knowledge and that are poorly investigated tend to generate discontinuities and conflicts or non-interaction between systems, while more holistic judgments could help to generate synchronicity. Note that boundary judgments are made by actors in cases and by researchers investigating actors in cases.

In this attempt to increase our understanding of how processes really evolve, it appears that organizations that are assumed to be in charge are, in fact, just one of the many self-organizing subsystems in a larger process system. It is quite possible for one subsystem to have so many resources that it really can dominate and control a governance process. In complex systems, though, this is an exception that confirms the normal situation of mutual interdependence that has already been indicated by so many network theorists (cf. Koppenjan and Klijn, 2004).

Added to this concept from network theory is the insight that all subsystems organize their own perception and actions, but they can have two rather different types of orientations. Firstly, each subsystem can be oriented mainly by sticking to its predefined content (“My problem and my preferred solution”) and the boundaries it has set between itself and its environment and between its relevant process and the outside world. This orientation is known as autopoietic or conservative self-organization. Secondly, it can be aimed at exploring alternative content and setting new system boundaries, or dissipative self-organization.

Autopoietic self-organization reinforces the stability of a system. It can, however, also establish a situation of inertia. Bonno Pel has shown in his chapter how engineers responsible for traffic management tend to define the problem of traffic management as a control problem. Car drivers are considered to be a nasty self-organizing subsystem that causes accidents, disturbances and congestion in the traffic system. Effective action should be undertaken to control the resulting disorder. It is for this reason that they tend to optimise a technical control system, even if the results are limited. He also indicates the birth of a contrasting paradigm supported by another self-organizing system promoting the self-organizing capacity of road users as a solution to traffic problems. Both subsystems seem to live their lives apart, without creating any synchronicity. Both seem to provide only partial solutions to the existing problem. In that sense even the new contrasting subsystem seems to perform in an autopoietic way.

Buijs, Van der Bol, Byrne and Teisman have shown how a metropolitan area is guided by a variety of governmental organizations. All governments develop self-organizing capacities mainly based on their internal

ambitions and priorities. For instance, they develop renewal projects that are only based on their particular interests, without taking the interests of surrounding areas and their governmental organizations into consideration. The core of governance processes in the metropolitan area is reduced to the question of who is able to obtain money for their projects. Mutual autopoietic self-organization seems to lead in this case to zero-sum games and mutual dissatisfaction. There are numerous attempts to restore authority and control in this interdependent metropolitan governance system but they are destined to failure. Each subsystem seems to be powerful enough to frustrate any proposal that will redistribute its resources to others or a new formal entity.

The seemingly tempting aspect of autopoietic self-organization is that it seems to reduce complexity, for instance through decoupling between actors and the environment and between causal patterns in events. This is the process of simplification that does not correspond with social and physical reality (Morçöl, 2003). A fixed content and system boundary is set and presented as the only meaningful and true way of sense-making and action. Such a strategy is often applied to the repeated production of resources. It is assumed that fixed boundaries help to improve efficiency.

The second appearance of self-organization is the adaptive or dissipative one, in which subsystems are confronted with dissatisfactory results for themselves or a larger system, and begin exploring alternative content and system boundaries. Dissipative self-organization brings a process into a more dynamic system state in which it could reach a new temporary equilibrium and regain a new fit with its environment. Pel indicates that the shared space movement in traffic management redefines the definition of traffic management radically in terms of self-management by road users.

In the case of the metropolitan area, there are many manifestations of dissipative self-organization, especially in terms of program management and alliances. Program management is the attempt to increase the synchronicity in terms of the content among a variety of projects. It gives self-organizing governments the ability to combine their self-interest manifested in projects with some kind of joint interest developed in program ambitions and aims. It appears to be a promising way to synchronize interests and even to develop joint interests. The content of what policy-making is about is reconsidered and new boundary judgments are set. The authors also indicate that dissipative self-organization is often developed in new informal networks of people from a variety of formal organizations. Dissipative self-organization appears to emerge more easily on the boundaries of subsystems than in the core of one of the constituting subsystems. This is also an important insight for the management of governance processes: synchronicity can be achieved at the borders of existing subsystems rather than at their core.

This does not imply that attempts by governments to induce change in other actors are non-existent. Self-organization is a response to

external pressures and pressures from other governmental organizations can induce a certain pattern of self-organization. The effects of such incentives, however, always depend on the way in which self-organizing process systems respond. Control and guidance can only be established through mutual adjustment of how self-organizing subsystems behave (Ostrom et al., 1992).

Sometimes this interaction leads to synchronicity. Research presented by Cawson (1985) and Boons and Strannegard (2000) show how European governments abstained from legislation in exchange for commitment from sectors—as compounded process systems—to develop their own regulation. These emerging governance arrangements result from self-organization. In fact, the research of Healey et al. (2003) and Innes and Booher (2003) supports this insight. Governments really can provide incentives for self-organization in addressing collective problems by stimulating the emergence of collaborative, bottom-up governance initiatives. Nevertheless the response of subsystems is decisive for the true impact.

Governments thus can set decisive boundary conditions that produce selection pressures on subsystems that in turn induce an adaptive self-organizing capacity. Creating conditions, however, is different from exerting control. It is also heavily based on trust in the ability of others to combine self-interest with joint interest. Synchronicity between guidance and self-organization implies adaptive behaviour from each subsystem, the guiding systems alike.

### 13.2.3 Coevolution

The third core theme in this book is coevolution. Coevolution as a concept helps scientists and practitioners to focus on the interactions between self-organizing subsystems as one of the important sources for the evolution of processes. The interaction between systems is conceived as reciprocal selection pressures that cause mutual adjustment. A coevolutionary revision of decision-making abandons the implicit or explicit anthropocentric perspective that is often assumed in the domain of public administration. Both scientists and practitioners like to think of a (group of) central actor(s) that forge success or cause problems. The coevolutionary perspective shows that this anthropocentric thinking is inadequate for describing and analyzing the complexity of factors that shape a policy process. Even more so, an anthropocentric perspective denies a polycentric perspective that is a more adequate view on complex reality that could enable synchronicity in decision-making.

Many earlier theories in public administration have a distinct evolutionist character. The concept of coevolution in decision-making builds upon existing theories in public administration that highlight the evolutionary characteristics of governance processes (e.g. Cohen et al., 1972; Kingdon, 1984; Hogwood, 1987; March, 1994). Coevolution as a concept, however,

goes further by defining and analyzing the patterns of reciprocal selection between processes. It highlights the fact that governance processes are not isolated, unitary systems that evolve in a more or less predictable way, but consist of sub-processes that can coevolve in non-linear dynamic ways. As such, the concept of coevolution challenges the centric perspective on processes. Processes are not bound by the boundaries drawn by government initiators. Processes can grow, change appearance and even fade away under pressure from other surrounding processes outside the defined area. If one of the many latent relationships with other process systems becomes manifest, it often comes as a surprise to managers who thought that the relations did not exist or were of no great importance. Therefore, processes should be analyzed as being nested, and as parts of overarching living process systems. There are four aspects to coevolution:

1. Decision-makers most often assume that they are in control of a system but empirically, they engage in a pattern of feedback loops with other subsystems. Consequently, they are governed by other systems as much as they are able to govern systems.
2. While a certain part of these feedback loops are perceptible and therefore more or less known, many of the feedback loops are obscured through complex causation between systems. Consequently, the outcomes of a policy process are often unexpected and sometimes even unfavourable.
3. The unexpected and sometimes unfavourable outcomes require decision-makers to respond, regardless of whether they want to or not. As such, they lose the initiative and are pushed into a reactive role. Coevolution therefore means reciprocal selection pressures between processes because future options are defined outside the reach of decision-makers.
4. Upon facing the uncertainty ensuing from complex causation and its unexpected outcomes, decision-makers often respond by simplifying their projects and routines. However, simplification does not just remove the complexity of the process and decision-makers are continuously engaged in coevolutionary processes regardless of whether they like it or not.

Coevolution can be a pattern of reciprocal selection in which actors do not understand why and how they are influenced by one another, as shown in the Hamburg case (Chapter 8), where the authorities did not understand the self-organizing capacities of the estuary system. It, however, can also be part of a management strategy aiming at generating synchronicity. Synchronicity occurs when two systems develop in a symbiotic way. In the case of Gouwe Wiericke (Chapter 9), the inclusion of actors with different agendas within a collaborative governance process results in a process initiative that displays a synergetic combination of diverse ambitions.

It is also possible for one system to flourish at the expense of others. In the case of the West Coast Main Line, Virgin as a private service provision system and Railtrack as the private infrastructure provision systems were developing a parasitic relationship. In market situations, this evolution can lead to the survival of the fittest. In this case of mutual interdependence, even though it was neglected by Virgin, the dramatic outcome was not only the dissolving of Railtrack but also a weaker position of Virgin in relation to the newcomers Strategic Rail Authority (SRA) and Network Rail.

In the Hamburg case a long period of exploitation by the port authority was 'accepted' by the physical system. There seemed to be synchronicity on the advancement of the port activities. After passing a certain threshold in the morphology, however, the 'parasitized' physical system shifted towards a new equilibrium that created major problems for the port authorities.

Coevolution between parallel governance processes can generate unexpected and unintended dynamics within these processes. In the Gouwe Wiericke case, it can be observed how the establishment of a solution for the problems within this specific polder was influenced by the selection pressures exerted by the Nature Policy Planning process of the Province Zuid Holland. This parallel policy process removed any room for the outcomes of the collaborative process in the polder by dictating the nature objectives for the whole provincial jurisdiction in general and thus also for this polder. All the examples discussed here show that the coevolutionary perspective adds explanatory power to the question of why policy processes evolve in erratic ways.

### 13.2.4 Process Systems and their System State

The previous sections summarized the findings on the complexity of policy processes and decision-making. As should be clear by now, policy processes are seldom stable *ad infinitum*. Such processes can go through different stages at different times and in changing circumstances. The existence and manifestation of non-linear dynamics, self-organization and coevolution lead to changes in the course of policy processes.

Among decision-makers there is an ongoing desire for stability in process systems. This desire is understandable because perturbation means that the policy goals are not achieved or require an increased amount of effort to be achieved. The desire for stable states feeds the efforts and desire for steering capacity and increased control. A considerable amount of research has aimed to find the control parameters in order to create stable states, but such attempts have failed (Otter, 2000). The disposition of process systems changes over time. Four system states are distinguished in this book: stable, dynamic, inert and superfluous.

*Stable* processes are equilibrium states that can be punctuated by change. If no evolution occurs, such a system becomes *inert*. The process system then reinforces its current state, while the environment changes. Effective buffering of a system against change can lead to stable governance processes, while ineffective buffering against change can lead to inert processes that are not



able to adapt to changing circumstances. Such ineffective buffering can, for example, be found in the traffic management case in which new challenges only reinforced existing problems due to the current system's inability to adjust. Another example is the ineffective denial of physical system demands in the second round of planning for a deeper Unterelbe.

In contrast to stable processes, *dynamic* processes are transitioning towards a possible new equilibrium state. Dynamics imply that actors within a process system have the ability to find a new equilibrium at a different level. Dynamic processes are in a certain state where stabilizing and destabilizing forces are both present and balanced. Dynamic process systems, however, will find a new functional equilibrium when disruptive circumstances demand adjustment.

If a process is characterized by too many possible outcomes and a high frequency of changing directions it can dissolve, fade away or burst. A process system is then unable to re-establish itself after radical changing circumstances. Such a state is termed *superfluous* because it does not result in adaptation to the environment, nor does the system exert selection pressure on other process systems to which it is related in a way that causes these systems to adapt to the superfluous system. Similar to the inert state, the superfluous process system is detached from its environment, not through decoupling, but by going through oscillations that fail to stabilize. When this situation does not change, the system will dissolve. This occurs, for instance, if a new search for innovative approaches is begun, enthusiasm grows, new ideas, expectations and dreams are brought in whereupon it becomes impossible to assemble this into targeted collective action.

Thus, process systems evolve through time because of interactions with their environment, which consist of several other interconnected process systems. As a result, such processes can follow an erratic course. From a hierarchical perspective on governance, such capriciousness is undesirable because it renders the results of collective action difficult, if not impossible, to predict and achieve. The vocabulary offered by complexity theory and used in this book helps to understand the patterns that cause erratic evolution and the way to influence these patterns—without the promise of control.

The distinction between generic principles and recursive patterns is important. It shows that, while complexity theory allows for an extraction of the patterns driving erratic change, it does not strive to find universal laws of decision-making. More empirical research on multiple cases should help to carve out the patterns that give rise to different system states more precisely. In addition, it is necessary to gain more insight into what defines a certain system state and how systems behave in such a state.

### 13.3 LOOKING MORE CLOSELY AT THE PROCESS SYSTEM

As discussed earlier, the research in this book has led to a conceptualization of processes as process systems, i.e. processes have systemic properties.



Such a system is often much broader than the process defined by an initiating actor. Each actor tends to limit a process in duration and width. These boundaries are based on a specific, subjective judgment about what the process is about, who is included and excluded and how results can be achieved. This ‘rational’ strategy, however, is confronted with a world of non-linear dynamics, self-organization and coevolution that can disrupt governance processes to a large extent.

The many cases discussed in this book have shown that actors in processes tend to define their boundaries tightly: “I am responsible for this and not for what is outside this boundary”. Frequently, however, outside world events or actions have considerable impact on the processes. In order to increase our understanding of process systems, a contingent analysis is required.

In contrast to the first generation systems theory that sees conceptualized systems as objects that can be disentangled and re-engineered, the evolutionary approach in this book acknowledges that systems and their boundaries are not a given ‘thing’, but rather, are social constructs generated by the way in which participants and researchers define and redefine the content and the boundaries of the processes they are confronted with. There is no fixed content, nor is there a fixed set of relevant actors or events or fixed boundaries. In this extended and fluent reality, actors connect with one another, actions are followed by responses and groups of actors engage in autopoietic or dissipative self-organizing behaviour around a certain topic. Four interrelated levels are distinguishable in process systems:

1. *Individual and collective agents* can be seen as basic elements of process systems.
2. *Organizations* are relatively stable coordinative structures of activities, and consist of formal rules of sense-making (mission statements, procedures, organizational charts, etc.) and behaviour (coordination, management, rewards and punishments). Such stable assemblies may exist even though their goals change over time.
3. *Coordination between individual or corporate actors* are the multilateral relationships between actors that remain autonomous, yet coordinate a specific part of their activities based on their boundary judgments.
4. *Genetic element of systems*. This is more commonly referred to as the institutional level: the (formal and informal, written and implicit) rules and procedures developed over a prolonged period of time.

Together, and through their mutual interactions, these levels constitute what can be called the governance capacity of a process system: the ability of such a system to realise effective and legitimate collective action.

### 13.3.1 Insights about Agents in Process Systems

Individual and collective agents are primary sources of action. They make judgments about relevant sets of elements and boundaries for action.

Reflexivity, boundary judgments and assumed or assigned roles are central concepts in understanding the way in which individual actions relate to process systems. Reflexivity refers to the ability of persons to reflect upon the consequences of their actions, and change them based on this reflection. Reflexivity is therefore a basic form of feedback at this level. In choosing among alternative actions, individuals construct boundary judgments, i.e. they have a more or less explicit definition of the relevant process system(s) of which they are part. These judgments define the extent to which they are confronted with change events. Based on their boundary judgments, individuals interpret their role(s) within the system, and decide in situations of role conflict which role is the most appropriate in that situation.

The cases in this book show how actors operate in process systems. Actors who play the role of project managers clearly develop a different strategy from actors who play the role of stakeholder managers. Chapter 11 has shown that project managers focus on a narrow object of management while process managers tend to be receptive to a population of process systems. In doing so, they are less focused on getting a certain job done but better equipped to organize interactions between process systems. Their cases contribute to the idea that process development can be facilitated through combinations of management styles, which Teisman (2008) calls a dual management approach.

The cases suggest that project-oriented actors seem to favour autopoietic self-organization. The extended process system is interpreted in terms of the risks to their project. Stakeholder-oriented actors seem inclined towards an adaptive strategy that allows them to incorporate the (inevitable) dynamics and seem to be able to cope with more complexity than project-oriented agents. They therefore add qualities to process systems and could presumably enhance its governance capacity.

Another distinction can be made between actors who build their strategies on trust and those who prefer the control mode. The control-oriented actors interpret process systems mainly in terms of hierarchical coordinative structures with a clear focus on control while the trust-oriented collaborative approach seems to lead to quite different management strategies. The effectiveness of both strategies seems to depend heavily on how the extended process system responds. System interpretation by managers is an important variable in understanding the dynamics of governance processes and their governance capacity.

### **13.3.2 Insights about Organizations**

Formal arrangements form stable assemblies in process systems but they are not decisive for the trajectory of the process, as is often assumed. Organizations in an era of complexity fulfil valuable functions by presenting a safe base for actors and by building some order in a swirling world of interactive processes, network governance and temporal, hybrid organizations. At the same time, however, their characteristics can also easily frustrate

processes because the same characteristics can lead to inertia. The cases in this book indicate the helping and frustrating functioning of organizations. The many agencies involved in the case of metropolitan governance of the Randstad, characterized by their conservative self-organization and parasitic coevolution, make concerted action impossible. However, when other agencies recognise their mutual dependence and interrelatedness with other agencies, dissipative forms of self-organization and symbiotic coevolution can be found. This substantially improves the governance capacity of a process system.

The evolutionary approach highlights the double and sometimes ambiguous roles of organizations. It is, however, necessary to do more research on the possibilities of flexible organizations in order to provide room for dissipative self-organization and symbiotic coevolution to organize the conditions in which processes can deliver the desired results.

### 13.3.3 Insights about Partnerships and Networks

In process systems, governance capacity is generated through the coordination of the activities of actors. This is achieved through multilateral relationships. This idea is well known in organizations theory where partnerships and network building has been well studied (Snow et al., 1992; Child and Faulkner, 1998). This insight has also been influential in the governance debate, where the relationships among governmental agencies and between governments and private actors have been given much attention. Often, such arrangements are presented as a way to increase the flexibility of policy-making, which is deemed necessary in order to manage unexpected situations (Kettl, 2002). Diversity, in combination with a sufficient degree of cohesion, is required to generate the capacity for realising innovation (Van Buuren and Loorbach, 2009).

Yet partnerships and networks have a dual quality which resembles the 'mixed blessing' of corporate actors. While they may enable a more flexible approach and induce learning and innovation among their members, partnerships and especially networks can also stifle constituent actors, leading to inert system states (Boons, 1998). The decision-making with regard to the second deepening of the Westerschelde reflects such a network in which actors kept each other in a deadlock for more than 15 years.

This leads to the question of how partnerships and networks can enable dynamic system states. The conditions for this have been sought primarily in terms of network characteristics and actor strategies (Koppenjan and Klijn, 2004; Marcussen and Torfing, 2007). Connections provided by partnerships and networks are not an enduring characteristic of process systems. The arrangements change and develop along with the processes over time. It is by no means the case that arrangements are made just to support the process. Many are born, or readjusted, for other reasons. Nevertheless they support the facilitation, disruption or breakdown of processes. Their

temporality is an important factor that explains much about non-linear dynamics in governance processes and the loss of governance capacity.

Two examples can clarify this notion. In the Gouwe Wiericke process (Chapter 9), the unpredictable interference of other process systems induced the emergence of new relationships. These relations are as strong as is perceived necessary by the involved actors and therefore can be too weak or too strong. With regard to the provincial nature department, the water department underestimated the importance of good relations, while at the same time the relations with the Minister of Spatial Planning (to guarantee national attention and hopefully put some pressure from the national government on the province) were overestimated. In the case of the estuaries (Chapter 8), it can be noted that, as a response to changing physical conditions and the desire to understand the physical system better, governments invested effectively in their relations with a more diverse array of knowledge institutes than ever before in an attempt to understand the physical complexity better and to enhance their governance capacity.

### 13.3.4 Insights about Systems' Genetics

The genetic structure of process systems revolves around the formal (legal, explicit) and informal rules that structure the ecology of systems that belong to a certain domain, for instance, health policies or infrastructure projects. In these domains the scope of the actions and the forms of interaction between actors within that system are often established based on the past: "this is how we do it here" and display a remarkable degree of stability or even inertia. This means that the domain both facilitates and restricts the development of processes and thus their governance capacity. As pointed out in institutional theories: stiff institutional provisions are a guarantee for inertia and at the same time can prevent systems from becoming superfluous.

In this book, the institutional structure of the cases has not been studied in depth. However, there are some suggestions about the impact of institutional dynamics. Institutional transformation has an enormous impact on the way in which process systems behave. The transfer of the West Coast Main Line process from a purely public genetic structure to a dominantly private domain also brought in a whole set of private rules on market orientation and innovation. The actors in charge of the upgrading of the line incorporated the private domain rules and orientations without much reflection on the question of whether they matched the objective of marketing and innovation.

Where institutional theories emphasize the decisive impact of institutional structures on processes, this book emphasizes that the institutional aspect constitutes just one category that is relevant to explaining process dynamics. The dynamic influence of coevolving surrounding systems, and self-organizing subsystems, actors and relations can be at least as important

as institutional change. However, the institutional structure normally functions as an important (implicit) filter for actors to make their boundary judgments and changes within that structure often influence a process system more thoroughly and have a more lasting impact than other changes (March, 1994).

The insights on the four levels of process systems provide some clues about how each level can build resilience to deal with the complexity of process systems. Such ideas should be treated with care because the point of departure in this book is that local explanation and deducing generic laws from local cases is difficult and challenging.

However, there are some clues that actors in process systems need to be able to apply dual strategies. In other words, they need to combine the demand for stability with the need for flexibility, the demand for control with the need for trust, the demand for fixed goals with the need for exploration. In a similar way, corporate actors need to organize themselves in a flexible manner and be open to cooperation. The relational networks need to be widespread in order to promote diversity in the network and learning in the network. Finally, the institutional conditions should allow for predictability but also for renewal.

The authors acknowledge that these clues are sketchy at best and remain relatively abstract. This is inevitable. Nevertheless, the cases in this book show that process systems that display the characteristics discussed here are more successful in dealing with the complexity of their environment than process systems that do the opposite. The following section is an attempt to describe in more detail how complex process systems can be managed.

### 13.4 MANAGING COMPLEX PROCESS SYSTEMS

In the cases described in this book, managers struggle with the complexity they find themselves in. Often, this complexity is not exogenous but interconnected with their own actions. Their actions are parts of processes they manage within the context of self-organizing actors and processes. By engaging in management activities they contribute to how processes develop. However, the outcome is still dependent on how self-organizing units and sub-processes coevolve. It can be observed that managers confronted with desirable outcomes tend to position themselves as leaders of a successful process. In hindsight they tend to draw extended boundaries of the process system. If the process fails to deliver the expected results, managers tend to take responsibility for a smaller part of it. It once more shows the subjectivity of boundary judgments and also the temporary nature of boundary judgments.

Managerial behaviour is based on the sense-making of managers about themselves and the systems they are in. They reflect on their behaviour and boundary judgments. They want to survive and advance as a person and as

an official, but also aim to contribute to the survival and advancement of their actor peers and relational network, the organization they are in and the genetic elements of their system. The strategies performed are combinations of sense-making about the four levels of the process system and the best way to deal with the requirements following from these different 'affiliations'. The wise lesson presented by Simon is still worth repeating: there is no best practice to copy and therefore there are no guaranteed steps to success.

Despite these remarks we want to emphasize our observation about managing processes. A duality of strategies should be the norm in complex systems in order to get or keep a process system 'on the edge of chaos', i.e. a dynamic system state (Merry, 1999; Haynes, 2003, see also Chapters 9–11 of this volume).

The methods and strategies of developing and combining more autopoietic and more adaptive management approaches are developed, however, rather implicitly and by way of trial and error. In this process there seems to be a certain preference for the management approach that defines process systems more tightly and homogenously. As Teisman, Westerveld and Hertogh (Chapter 4), as well as Edelenbos, Klijn and Kort (Chapter 10), show in their cases control, risk management, and scope fixation still are presented over and again as suitable management instruments. The same and other cases, however, show that this approach is no guarantee for success (in terms of getting results and sticking to the initial decision and aim) especially when disturbances of processes occur. Then managers sometimes shift to a more adaptive strategy in which risk taking, scope adjustment and explorative strategies are allowed. In several cases this is done rather consciously, in others accidentally.

It seems of great importance to us to do more thorough research on the combination of these two types of strategies. System dynamics, competing patterns of self-organization, and coevolution force managers to adopt a dual approach: they have to understand and try to manage their own system to reduce its vulnerability, but also have to be sensitive for their environment and have to influence the interrelation between their own system and its environment to safeguard the added value of their own system. Our cases indicate how combinations are made and work out.

We refer to the public versus private duality in Chapter 5 and the anthropocentric versus polycentric approach of estuaries in Chapters 6 and 8, the duality of autopoietic and dissipative self-organization in Chapter 7, the duality of exploration and exploitation or competition and cooperation in Chapter 9, the duality of process and project management in Chapter 10 and last but not least the duality between trust and control in Chapter 11. Complexity and duality seems to go hand in hand. A combined application of seemingly paradoxical strategies fits in with the demands of complex systems and contributes both to stability and dynamics (McKelvey, 2002; Stacey, 2003; Nooteboom, 2000; Gilsing, 2003).

A further refinement of this dual strategy is delivered in Chapter 10 where the authors state that “managers have to be aware that projects go through different states (from inertia, chaos and dynamics to stability in random order), and that their style has to correspond with the special state the system is in”. Further they state: “inert systems are not helped with project management, but need process management to get the system unlocked, and to change to a more optimal system state. Above all, the management of complex systems seems to be a *gentle counterbalancing act*, in which project and process management have to alternate”. In the words of Chapter 11: “Public managers need to develop creative tensions (Nootboom, 2006) to shift gear from trust-based coordination to control-based coordination and back. What is crucial when shifting gears is not to lose sight of the combination as a whole (. . .). Combining trust and control may be compared to skiing; when skiing one continuously uses two legs, but one changes the amount of weight placed on one or the other leg in order to maintain balance and keep to the right direction in a continuously changing environment”. Both the serial as the parallel application of contrasting management styles have to be further investigated.

A management theory on duality necessitates a better understanding of how boundary judgments are made with respect to process systems. Managers act based on (implicit) boundary judgments, and thus on their subjective judgments of how reality can be perceived, which values will be appreciated and how action has to be performed (Vickers, 1965). A more restricted boundary judgment helps a manager to restrict his/her actions and attentions to a process system that can be known and controlled better. It, however, increases the chance of disturbance from outside events. Whether a manager really is able to control his process therefore is a function of his personal judgment and the degree to which the outside (and even inside) world respects and fits within these boundaries. A broader scope leads to more inclusive process systems where ambitions and actions can be combined and consensus between possible diverging strategies more easily is realised. It, however, also charges managers to keep in context with a variety of surrounding systems and contains the danger of evaporation.

A last proposition about management can be made with regard to the notion of coevolution. Managing processes is the art of consciously managing the consequences of interconnectivity in process systems. We do not favour the idea of maximising interconnectivity as a management strategy. Nevertheless, process systems are interconnected in a much larger degree than often is assumed. Managing coevolution means accepting the existing and widespread interdependencies within and between process systems combined with the knowledge that management is also an art of simplicity. Separating process systems temporarily while using their interconnections when this seems to be productive seems to be a promising management approach that should be elaborated upon more (Van Buuren and Gerrits, 2008).



### 13.5 EPILOGUE

In this book, all actors are involved in the question of how a vital public domain can be established. The first step in order to be able to answer this question is to achieve a better understanding of how this domain functions and what is required for vital and dynamic governance process systems. One of the main topics the public domain is struggling with is complexity. It is difficult for any actor to fulfil the seemingly endless and conflicting needs and demands of societies, to deal with the seemingly endless number of self-organizing actors in governance processes and the interferences of external events, unforeseen coincidences and unexpected changes in what actors do and say.

Understanding the complexity of society and government therefore seems to be an important prerequisite for public management scholars and practitioners, before the question about a vital public sector can be answered. Complexity theory is a logical companion. The message of complexity, however, is not a platitude. This book does not wish to make the obvious statement that “the world is complex”. The contribution that this book hopes to make is to name, define and analyze the disposition of complexity and its consequences for decision-making and policy processes. Although some of this complexity has been touched on in the field of public administration, it should be noted that many practitioners and even scholars tend to forget the points of departure for complexity the moment they are appointed to be in charge of a certain policy or implementation process.

The endeavour to understand the complexity of policy processes has not come to a conclusion with the ending of this book. Research in the domain of public administration that attempts to understand complexity in one way or another has been conducted for decades, and this book is another step in that search for understanding. It is clear that much more work remains to be done but we hope that this book is a helpful starting point for future research.





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