CHAPTER 1

Artificial Green Corridors Crossing Large Infrastructure in Metropolitan Areas

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Abstract

Metropolitan areas have a growing need for better connections with inter-urban green areas, which are better dissected by large infrastructure networks. This chapter analyses the planning process of the green Craailo bridge in the Netherlands, the world’s largest artificial and a very expensive nature bridge. The planning process appears to have been far from linear. In fact, many incidents, sudden changes and unexpected opportunities were evident during the planning process, not described in common planning literature. The complexity perspective and planning process of the Craailo bridge were analysed based on several policy documents that were scrutinised, along with 19 interviews conducted with key players. A new perspective on highly complex planning processes in the spatial planning practice was introduced as a final result of this research.

Keywords: Complexity Theory, Craailo nature bridge.

1 Introduction

In earlier articles [1–4], it was concluded that the outcome of complex land-use planning processes can be highly uncertain. Steady and balanced planning processes were described, along with the impact of pressure from new societal events and ideas. In some circumstances, the end result of the planning process was completely unexpected and surprising. In this sense, the level of control of land-use planners in complex land-use planning processes is questioned. This chapter discusses the complex planning process involved in the Craailo nature bridge.
The Craailo bridge consists of more than 800 meters of nature area, enabling recreation possibilities and the movement of people from one forest area to another, crossing among others a railway and a highway. The costs of the bridge were huge: more than 14 million euros. At the beginning of the process, the task seemed to be somewhat of a ‘mission impossible’; however, being aware of, and using the uncertainty of complex planning processes, this mission impossible finally was accomplished. This chapter describes and analyses the planning process in the context of the theory of ‘planning by surprise’, which combines Complexity Theory ideas and Land Use Planning practises [5]. The Complexity Theory and its meaning in social science in general and in governance and spatial planning specifically are discussed. We discuss how the Complexity Theory can be the bridge between social and natural sciences. Accordingly, we describe the methodology used, which aims to better understand complex, and sometimes surprising, land-use planning processes, by studying them from a complexity perspective. We present a broad insight into the Craailo nature bridge planning process, described as a developing complex system. In conclusion, the implication and understanding of complex land-use planning processes are discussed.

2 Complexity Theory

The Complexity Theory is a relatively new and developing science with an origin in thermodynamics and other natural sciences, such as mathematics and physics [6]. Complexity has been brought to a wide audience by authors such as Gleick [7], Lewin [8], Waldrop [9] and Cohen and Stewart [10]. From the beginning, Prigogine [6] claimed that Complexity Science, although originating from thermodynamics, is of high relevance for social sciences especially related to the adaptation of a system to its changing environment. Many authors now consider Complexity Science as the science bridging the gap between social and natural sciences [11–14].

How do complex systems behave? There is a wide range of literature explaining this phenomenon. First of all, the behavior of the whole system is studied, and any analysis that is reduced to a part of a system is rejected [15, 16]. In time, the system can develop in a non-linear way, while also new properties can emerge suddenly. Any small change in the system or its environment can be the start of huge changes, including totally unexpected ones. Complex systems develop by evolution and are not reversible in time [17, 18], as explained subsequently.

Complex systems can remain in a stable state for a long time – this state is called an attractor. However, every system keeps energy and information from its environment so that it develops towards greater complexity and sometimes to total decline [17, 19]. The system tries to stay in its known attractor, which is a state of equilibrium; to do that, it slightly adapts to the outside developments. At the same time, there are other attractors (alternative states of form and operation) present to which the system can shift. However, only a shock can drive it out of the current attractor (for instance, when enough pressure between the system and its environment has been built up). The system is then likely to become unstable as a consequence of changes in its environment. As linear and steady adaptation becomes
more and more difficult, the system can develop into an unstable and chaotic situation. The shock can transform it from one state of order (attractor) through a chaotic situation into another state of order or attractor. The change is rapid, non-linear and chaotic, and its direction is unpredictable although some authors also note that there are no endless possible new attractors. Within a path dependency, there is a limited, although often unknown, amount of possible attractors, referred to as deterministic chaos [15, 20, 21]. This implies that the system’s successive states are found within a restricted set of possible situations. The moment of change, the so-called bifurcation point, is very important for the study of complex systems [15, 22]. This is the moment when a system turns over from a slight in equilibrium kind of development into a radical regime change. While all systems and subsystems interfere with each other [23], observation and action by the researcher are decisive for the definition of any system. Figure 1 helps to understand the behaviour of complex systems as it schematically illustrates the evolution of a complex system over time [17, 19]. The system is in the equilibrium state \( x_1 \). When this state becomes less stable or less favourable, the system quickly adapts into a new state \( x_2 \), with a higher degree of complexity. Another possibility is development into a lower degree of complexity, which is represented by the downward line. The shifts occur rapidly.

The Complexity Theory has been accepted by scientists of a wide range of social disciplines [5]. Organization science is one of the early adapters with a strong focus on aspects of self-organization [24–31].

Attention was placed on the moment of change, enabling managers to act. However, Gersick [32] raised awareness of ‘an alternation of long periods when stable infrastructures permit only incremental adaptations and brief periods of revolutionary upheaval’.

Innovation science is connected to complexity science by a rich literature partly from organizational science and partly from manufacturing industry on product

![Figure 1: Evolution of a complex system showing the rising and declining complexity of the system (x) in relation to time (t). Source: Geldof [19]; Prigogine [17].](image-url)
land-use management and transportation planning

life cycles. Many different aspects of the behaviour of complex systems can be distinguished in innovation science, such as the ‘Prigogine’ curve [33,34]; non-linearity in innovations [35], different phases such as maturity, breakthroughs, new products or attractors [34]; and external influences such as the drivers of innovation [36–39]. In innovation literature the focus is not only on the moment of change, but also on the periods before and after the change [40–43].

The conceptual move in research from government to governance can be considered as the result of the growing attention to strong attempts that have been made in a special issue of complexity in public administration [44]. Teisman and Klijn [45] and Teisman et al. [46] made strong attempts to connect governance with the Complexity Theory. Again complex characteristics, such as ‘wicked problems’ [44], “different outcomes from initial expectations” [47], non-linear dynamics [48], self-organization [49], and unexpected system changes [50], are found in governance and public administration. The disposition of complexity and its consequences in decision making and policy processes [51] were illustrated.

The goal of land-use planning is to preserve an existing land-use situation or to change it. The introduction of the Complexity Theory in land-use planning and regional development literature is relatively new. This can be explained by the fact that planning is deeply rooted in the concept of control. Since the 1970s however, planning approaches and strategic thinking changed from a technical value-free and objective profession [52] into a more process-oriented and communicative approach with a growing role of numerous stakeholders. Instead of value-free facts, communication and power became highly decisive for the outcome of the planning process [53–56]. Nowadays, both spatial planning theorists and practitioners are aware of the fact that planners have to deal with uncertainty as unexpected outcomes [1, 2], fuzziness [57] and wickedness [58], all studying and rethinking long-term planning processes.

3 Methodology and Craaiilo Bridge

The reconstruction of the planning process of the Craaiilo bridge entailed an analysis of all relevant policy documents capturing the formal history of the area, along with 17 interviews held with key stakeholders (including the minister responsible for agriculture, nature and fisheries and her regional director, both responsible for conservation and further development of nature in the Netherlands; the mayor of Bussum and the vice mayor of Hilversum, both responsible for the local policy and members of the steering board of the Goois Nature Reserve (GNR), which has been the conductor of the Craaiilo bridge; two governors of the province of Noord Holland, responsible for the provincial spatial development policy and members of the GNR steering board; the director of the Alterra Research Institute who was a main advisor of the minister on nature policies in general and the Craaiilo bridge; the main researcher of Alterra involved in studies of the expected functioning of the Craaiilo bridge for nature; the directors of the National Postcode Lottery and the VSB Fonds, main financial supporters of the bridge; several journalists and opinion leaders from local and regional newspapers; and the director of Pro Rail responsible for the railway that was crossed).
It is important to note that interviews reflected on planning processes undertaken more than ten years ago. A ‘looking back perspective’ has the risk of implying a perfectly rational and linear planning process, whereas in reality, the process is far from clear, linear or rational. Van der Leeuw [59] describes this dilemma from the point of view of an archeologist:

Archaeologists have, in recent years, omitted to study the process of innovation, even if there are sufficient descriptions of change in material culture around. I believe that is the result of an approach which retro-projects onto the past. If we are to realize our avowed aim of reconstructing past decision-making, we will have to stop looking back from our present position in time, trying to recognize in the past patterns which are observed in the present. We will have to travel back in time and look forward with those whom we study. Instead of re-constructing origins, we will have to re-create innovation. That demands a major shift in perspective, which acknowledges the non-linear aspects of human perception in interaction with the linear ones.

The interviews were open and informal, attempting to focus on the critical moments in the planning process. This method of interview analysis is based on the methods that have been described as the Grounded Theory, developed by Gla ser and Strauss [60] with the goal to generate a new theory grounded in data or evidence in the field. The Grounded Theory has been accepted in the fields of social sciences as a method of research [61]. Van Dijk and Kopeva [62] applied the Grounded Theory in planning-oriented research. This research followed the descriptive approach of Strauss and Gorbin [63] using rich data from directive and interpretative questions to key persons [64]. We interpret the Grounded Theory as delivering perspectival knowledge on practice experiences [65]. The essence of this approach is not primarily the production of testable truth science, but it is aimed at joined understanding [66].

For a better understanding and illustration of complex land-use planning processes, the scheme of Fig. 2 has been developed based on the works of Prigogine [6] in chemistry and physics and Geldof [19] in water management [1]. As stated, the Complexity Theory ideas originally stem from chemistry and physics, but we adopted the Prigogine graph to build a model to understand complex land-use planning processes [1–4]. The use of the graph is common in transition [67] and innovation literature [33, 34] and is used increasingly in land-use planning literature [58, 68]. The use of the graph is thus common in sciences studying processes of innovative changes in time. We imply that the graph enables the case study of a project directed to change one type of land use into another, over a period of time. Figure 2 enables us to analyse and describe the development of a complex system (such as a land-use planning process) as a function of time (the horizontal axis). It presents the opportunity to study the development of a complex system from a stable linear state, via a chaotic state, into a new stable and linear phase. In this sense, we can analyse and describe the development of the complex system or planning process from the viewpoint of the project leader or another key person in the land-use planning process.
The scheme in Fig. 2 shows a land-use planning process, which behaves as a complex system in time. The following seven phases were identified as part of the process:

1. The current routine of a land-use planning process or a complex system;
2. Changes in the environment resulting in pressure to change the routine;
3. Inside developments trying to adapt to changes within the current routine;
4. A chaotic phase where pressure becomes so large that current routines are no longer appropriate and where small triggers can force the system to another routine;
5. Many different options for the process to continue (or not);
6. The sudden and unexpected jump to a formerly unknown new situation; and
7. A new routine of the complex system.

This chapter evaluates the Craailo nature bridge planning process in terms of a complex system as represented in Fig. 2. The aim was to better understand the planning process of the Craailo nature bridge and to evaluate if the model can be ameliorated. It is evident that the jump from phase 4 to phase 6 is highly unpredictable and bears a great amount of uncertainty; we named it ‘planning by surprise’. In this chapter, we identified that a powerful or smart agent is able to, at least to some extent, control the jump from phase 4 to phase 6.

4 Growth Management in Developing Countries

In 1990, in the Netherlands, a new national nature policy was launched. It included a plan for national nature network, de ‘Ecologische Hoofdstructuur’, or the
ecological main structure. At that time, the GNR was a nature conservation organization in one of the most heavily urbanised areas of the Netherlands known as Het Gooi, between Amsterdam and Utrecht, including other cities such as Hilversum and Bussum and numerous estates in the surrounding green areas. Het Gooi is one of the Dutch upper ten living areas. As a result of the national policy, the GNR developed a spatial nature vision in order to ecologically connect its main properties, which were dissected by numerous small and large infrastructure barriers. GNR then decided to start with the most difficult project, the Craailo nature bridge, with the idea that ‘if we succeed here, we will be able to realise all the other projects easily’. In 2006, the largest nature bridge of the world, the Craailo green bridge, was opened after a complex planning process, as discussed.

Until 1990, GNR was a nature conservation organisation owning many large and small natural areas in the Gooi region. The GNR steering board comprises the province of North Holland, the municipality of Amsterdam and the six Gooi municipalities. Since 1990, the six Gooi municipalities handed their natural areas and possessions over to the authority of the GNR. This process continued until 2006 when the last municipality, Blaricum, handed its natural areas over. This implied that nearly all natural areas, forest, heath, pasture and water, were now owned by GNR. The fragmented location of the various small areas and dissection of the infrastructure were considered problematic. GNR established a plan to enhance the connection between their fragmented natural possessions and simultaneously develop several large green bridges connecting the green properties and crossing the infrastructure. GNR changed its strategy from conservation to nature development.

4.1 The Craailo case

The ‘Zanderij Craailo’ area was located between two natural GNR areas. It was a typical urban fringe area between the large municipalities Bussum and Hilversum, adjacent to a provincial highway and a railway. To the west of the railway were two farms without future development prospects; in between the railway and the highway were sports field for hockey, a tennis court and an abandoned swimming pool; and to the east of the highway were more sports areas with tennis courts, golf courses, a depot for garbage and an animal shelter with facilities for dog training. Along the railway there was a large depot of the National Railway Company. The previous GNR areas were situated in the east of the Zanderij Craailo; and the newly obtained natural areas from the Bussum and Hilversum municipalities were situated directly in the west of Zanderij Craailo, implying that the described urban fringe area was located in the middle of the natural areas owned by the GNR. From 1995 to 1997, ideas and plans were developed to ecologically connect the two parts of the GNR possessions located in the west and east of the Zanderij Craailo. Initially, three ecological corridors, east–west-oriented stepping stones, were projected in the Zanderij Craailo; however, they are still restricted by the highway and the railroad barriers. A nature bridge was included in the plan, at first 450 meters in total, but eventually resulted in an 800-meter area, including two bridges and
three dikes. The aim of the bridge was to connect the natural areas in the east and west of the Zanderij Craailo for animals as well as for the recreation of the public. Recreational aspects were crucial because the area was densely populated and urbanised. In this sense, the GNR stated the importance of considering the interests of the deer and the other animals and also of the inhabitants of the area. Here the local community as represented by the GNR conflicted with the national nature development community.

After reaching consensus about the development vision, attention was placed on the realisation of the project, facing two main problems. First, the cost of 30 million guilders was tremendous, partly because the bridge was over 800 meter long, partly because of its multifunctional character. Second, the urban fringe land use in the Zanderij Craailo area was extremely fragmented and partly very well rooted in the local and the regional society. How did GNR deal with all those problems and come to a successful realisation of the largest nature bridge in the world? We analysed the developments over a period of time.

The first opportunity came already in 1993 when one of the farms in Zanderij Craailo was put up for sale. At that time, the GNR had housing problems as the ‘office’ and the ‘yard work’ were in two separate buildings, not favouring good cooperation and legalities. The farm became the new GNR office (including the office and the yard work). In 1996, the other farm was included in the ecological main structure plan and was changed into a nature area by the national and provincial government. All farming areas in the Zanderij Craailo area were now replaced by nature development areas.

The GNR bought more small areas during this time, working step by step on the realisation of the three stepping stones. Negotiations to obtain a large area in the southern part of the Zanderij Craailo area were started, but never realised. At the same time, the National Railroad Company planned to develop a 400-meter working station along the railway in the northern part of the Zanderij Craailo. The GNR refused to cooperate with these development initiatives and prepared for a juridical fight. The municipality of Hilversum (member of the Steering Board) supported the Railroad Company for economic reasons. Meanwhile, national law required the National Railroad Company to split up into three different companies, each of them still involved in the Zanderij Craailo working station project. Finally, the province (the governor is the chair of the Steering Board) rejected the idea and forced the GNR and the Railroad Companies to come up with a solution to include the ecological developments. That was the moment when the urban ecologists of the municipality of Hilversum proposed a large nature bridge instead of three stepping stones. The bridge was proposed to cover three dikes, the highway, the railway and the working station. After some doubts the GNR agreed to the proposed plan and, in 1997, a memorandum of intent was signed among GNR, Hilversum, two railway companies and the province. The goal was still three stepping stones; however, should the nature bridge realise, the other two stepping stones would not be necessary anymore. The original ambition to build some stepping stones for some 100,000 euros was thus replaced by the ambition to build a 13.6 million euro bridge.
A ‘play of chess’ action started for the GNR as numerous parallel actions on the field of spatial planning were needed, including practicality, financial issues and numerous debates about both aspects related to societal needs in the region. Within the new frame of the large nature bridge, GNR continued to negotiate with the many urban fringe–related land users. The animal shelter and several sport facilities were potential barriers to the bridge; they were removed and relocated to other places, however, in such a way that there was a big profit and financial gain for them as well. GNR profited from the fact that its organisation had changed from being conservation based to a development organisation, which owned a large amount of land in the highly urbanised region. The Gooi area and the nature bridge became a trending topic in regional debates.

The biggest challenge was, however, to obtain funding for the building of the bridge. Potentially, the main funding agent was the ministry of LNV as part of their ecological main structure plan, but the scope of the bridge did not completely suit its policy as the project was not 100% aiming at ecological goals only, and entailed an expensive green bridge due to its enormous length, its location in a densely populated area and its inclusion of recreational aims. LNV policy makers stated that green bridges located elsewhere in the country would be far less expensive and far more efficient from an ecological point of view. One of the railroad companies started to lobby and obtained funding for the nature bridge as part of a sustainable image of the company. In 1997, the National Postcode Lottery (the agent financing many social and sustainable initiatives in the country) was informed about the proposed project and, in 1998, the GNR won the so-called Pyramide Prijs, a price for the initiator of green development plans. GNR won because its plan ‘enriches the Ecological Main structure with cultural, educational and recreational aspects’. In an attempt to raise funds for the development of the bridge, the GNR organised a big event in 1998 as the formal start of the green bridge project. The ministry, the province, the railway companies, the municipalities, the lottery and more potential funders were invited. All 20 stakeholders received a cube each with a part of an image of the bridge to symbolise their importance in the realisation of the project. The stakeholders had to take the cubes home to their organisation and discuss what they could do to help GNR raise funds. The director of the National Postcode Lottery returned the cube the same day, along with a promise to make a 2.5 million financial contribution (20% of the estimated costs).

In 1999, GNR visited the new vice minister responsible for nature, working on a nature development policy change, aiming to enrich the goals of the ecological main structure with social, health and cultural goals. The vice minister was positive about the GNR plans and promised that he would contribute financially once the ecological and recreational relevance of the bridge was scientifically proven. This research was conducted by Alterra, a division of Wageningen University, who developed a new ecological model based on the meta-population concept, and this project was the ideal project to test the model in a real-life situation.

Meanwhile, the bridge was under discussion in the local press. An important politician posed a statement that a lot of money was invested to facilitate ‘a bunch
of rabbits’ while many other, more important social problems were not dealt with at all. This difficult populist discussion led to a public debate organized by the GNR between the politician and a professor in economy who was a well-known supporter of the relevance of economic investments in the sustainable manner. The debate revealed that the politician was not against the bridge itself, but had the opinion that the GNR as a huge regional land owner would become too powerful and focussed too much on ecology.

In 2001, the Alterra research was completed and the results were presented by the Alterra director to the vice minister. Surprisingly, especially for policy makers, the research proved that the green bridge would be successful and it would be possible to combine ecology and recreation goals.

A few days after the presentation GNR officially presented the report to the vice minister, who supported the bridge with 1.2 million euro subsidy, from a newly established policy. One month later, the railway company offered 2 million euros, followed by a 5.5 million euro contribution from the province. The lottery gave an additional 1.3 million euros to challenge the ministry to give another 1.2 million euros. The remaining budget was financed by different financiers and finally in 2003, the construction phase started.

4.2 Findings with regard to the Craailo case

The abovementioned process description is a summary of the planning process of the green bridge, which has been more thoroughly described by Woestenburg et al. [69] and in the 17 in-depth interviews that have been conducted. However, it is evident that the planning process has been far from linear and that many so-called critical moments have been noted. GNR key players had to deal with various surprises, uncertainties and unexpected events. We evaluated whether there was a certain pattern in the planning process and if this could be linked to the complexity perspective. Accordingly, the Complexity Theory related to spatial planning and governance will be described, followed by the interpretation of the planning process followed in Craailo in terms of complexity. The aim is to identify certain patterns that could enable us to learn from the green bridge planning process so that we can advise planners how to deal with this kind of wicked processes.

5 Redescription of the Craailo Green Bridge Planning Process in Terms of Complexity

The Craailo nature bridge development process can be described in terms of complexity as seen in Fig. 2. There were developments at the national scale, GNR scale and implementation scale; developments of different scales became interconnected.

Refer to Fig. 2: GNR was a typical traditional nature conservation organisation in a highly urbanised area in the Netherlands (1). Then in the mid-1990s, the Dutch national nature policy changed from conservation oriented to development oriented.
At the same time, many municipalities in the GNR area handed the authority of their natural and recreational areas over to the GNR. The GNR found itself with a much bigger natural territory, which was highly dissected by urban areas and large infrastructure. GNR had to change from conservation-oriented to nature development oriented, from highly fragmented territory into better-connected territory, and from only nature oriented to nature and recreation oriented. GNR needed a completely new policy. There were several uncertainties; the availability of investment finances from the national government was not certain because the national policy was still nature oriented and there was no funding available for investment in recreational development, although political discussions on this topic was gaining priority. Despite the uncertainties, GNR created a plan to connect their natural areas by obtaining land and by building bridges and other connections between the areas, crossing large infrastructure and creating movement possibilities for animals as well as recreating people. A second decision was made later on when GNR decided to start the implementation of the new policy with the Craailo green bridge, where the challenge was the funding complexities. By this decision an earlier option to establish just three stepping stones at Craailo was transformed. Due to the lack of finances, a big risk of failure existed, but GNR decided to still move ahead with the plan. A very complex process started when simultaneously the development plan was created, the consensus among all local, regional and national actors and stakeholders was reached and the required finances were collected. Finally, it succeeded and the largest nature bridge in the world was built. GNR had become a developing organisation.

Accordingly, we focussed on the sudden change in terms of complexity that occurred during the planning of the Craailo bridge, starting right after the moment of the awareness of the necessity of a new policy and ending with the realization of the green bridge. It was evident that within this process, the concrete process of planning and realization of the green bridge, and on another level of scale, numerous comparable ‘smaller’ planning processes occurred, which behaved like complex systems. These complexities were described from the point of view of the GNR project leader.

The project started off with a farm being obtained. At that time, the GNR nature strategy was conservation oriented. GNR faced housing problems. At the same time, due to outside societal developments, possible future development-oriented strategies were developed and within GNR the first ideas regarding the crossing of the Craailo area were presented. The moment the farm was for sale, all things came together and the challenge to obtain the farm land was realised, along with a solution to solve the housing problems and to take a step forward in crossing the Craailo area. Rapidly, the decision was made to take advantage of the situation and to buy the farm. In the new situation, the housing problems had been solved, and an initiative was made to cross the Craailo area. In the new situation, the awareness of the opportunity to buy the other farm developed, as that farm would not be sustainable in the long term and be transformed as part of the new land policy.

When the decision was taken by GNR to start with their biggest challenge, the Craailo green bridge, the ‘conservation-oriented’ GNR noted that a large amount
of finances was needed, much more than what was available with GNR and much more than could be expected from regular financiers, such as the ministry and the province (2). GNR had to seek new inevitably private sponsors; a new approach and a new attitude were needed (3). A great opportunity arose to get in contact with the director of the national lottery (4). GNR now considered the lottery as one of the potential sponsors for the Craailo green bridge (5). It was the start of a growing cooperation between the lottery and GNR (6), which exists to date. The lottery funding played a major role in the process of successful realization of the bridge (7) as it brought other sponsors, among them the ministry, on board.

From this point of view, there was also a major threat identified in the Craailo green bridge process. During the process of marketing and collecting finances (1), a local politician started a populist campaign against the idea of the bridge stating that it ‘supports some rabbits instead of more important societal problems’ (2). The GNR project leader feared that this could undermine his whole project (3), and had to respond (4) in an innovative way (5). He decided to organise the open debate (5) with a popular economic professor. This brought a stop to the campaign, and revealed that the politician was actually not against the bridge itself (6), resulting in the GNR process to realise and the planning of the bridge to proceed (7).

6 Discussion

The planning process of the Craailo green bridge has been described in terms of the behaviour of a complex system. This coincides with earlier findings in land-use planning [1–5], which helps to better understand complex land-use planning processes. The scheme of Fig. 2 enables us to analyse land-use planning processes in time.

There was a difference in comparison to earlier process descriptions made using the same methods of open interviews and redescription in terms of complexity [2, 3]. Earlier process descriptions illustrated that new development initiatives happened spontaneously and were not planned. Examples refer to the previous sentence where initiatives were not planned the green bridge in the Dutch municipality of Breda [2] were the newly developed urban green bridge ‘just happened’ and was not planned at all, but were the result of interacting processes in society planning for the new high-speed train infrastructure, highway infrastructure reconstruction, redrawing of municipal boundaries and the ‘green orientation’. Another example of spontaneous development was the land-use planning process in Spanish Galicia where thousands of small villages were abandoned [3] as people moved to the towns for job opportunities. Remaining farmers were not able to sustain their farming and the process of abandonment speeded up. In one village, Vila Verde, a collective farm was finally established with all families of the village owning a share. This was not the consequence of a rational decision by the government or village people; it ‘just happened’ because some people (an inhabitant, a project engineer and a governor) just met by coincidence and found a solution from an example in nearby Asturias.
In the Craailo green bridge example, GNR decided to set the ambition to realise an immense nature bridge, which would become the largest in the world, while GNR did not own large parts of the land and it did not have the necessary finance. However, GNR and its project leader were smart and creative enough to use any unexpectedly upcoming opportunity to come closer to their goals. Their initial goal, to cross the area in one way or another, was transformed by means of the green bridge, implying many expected and planned, sometimes unexpected and different, actions. Thus, in the Craailo example, the unexpectedness was not ‘just happening’ as in the Breda and Galicia examples. GNR and its project leader worked as strong and powerful actors. They wanted the bridge. The bridge was planned, and it was not just the result of unexpected events. Unexpected events were seen as opportunities and were used, managed and manipulated in such a way that they helped GNR in reaching its goal.

The study of complex systems has to deal with complex causations. The systems are dynamic and open and exhibit emergent properties; their outcome is often unpredictable and depends on multiple causes that interact unpredictably [15, 70, 71]. This is true for many complex land-use planning processes. However, in the GNR case, it was clear: a risk was taken, but the result was anticipated. Many unexpected, unforeseeable and surprising opportunities arose, which were used to reach the end goal. For other actors, however, the outcome of the process was a big unexpected surprise. Authors stress that complexity research case studies have to include history, path dependency and context [23]. System boundaries should also not be chosen too narrow [16, 71]. This chapter illustrated that the researcher has to carefully select the point of view.

References


