Chapter 2
The Condition of Complexity

2.1 The Systems World of Luhmann

The German sociologist and science theorist Niklas Luhmann (1927–1998) is an interesting theorist whose work has attracted great attention in very different professional fields. Attention in this context will naturally focus on his possible impact on the formulation of concepts and principles that can contribute to ground a framework for systemic planning (SP).

Luhmann has not least with his theoretical opus magnum *Social Systems* from 1984 (Luhmann 1995) formulated a coherent theory of social systems based on a number of assumptions and key concepts that allow him to illuminate issues that have impacted on later social science development in many ways (Moeller 2006). The use of Luhmann in this book is highly selective, but reference can in addition to those mentioned above be given also to (Leleur 2008a, b), where his work is treated in a more comprehensive way with its value for planning theory in mind. For the purpose pursued here the following quotation from Moeller can introduce Luhmann's radical way of thinking:

> *From the constructivist perspective of systems theory, reality is not something given, but an effect of cognitive construction. There is not 'one' reality, no one realm of 'being', as in the traditional Old European ontology—but rather a plurality of realities created through cognition. Cognition produces reality by producing system/environment distinctions.* (Moeller 2006, p. 70).

System/environment distinctions are a main focus in the part of Luhmann's theory that I will make use of here. Other import key concepts are autopoiesis and contingency.

Autopoiesis of Greek origin means something that creates itself, i.e. self-creation, while contingency describes conditions that are the result of a random outcome, i.e. something that also under the given conditions could have been otherwise. Those concepts are discussed further below.

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2.1.1 Systems According to Luhmann

To understand the constructivist perspective of Luhmann, we first need to come to grips with the way he actually perceives a system. In fact, he makes use of a new important perception.

Within the field of systems theory we first had a system as an entity consisting of a set of elements, which can be called the classical perception (Bertalanffy 1972, 1973; Leleur 2008b, c).

Next, associated with the work of von Bertalanffy, a system is perceived as 'open' because it thrives on energy and information flows across the system/environment border to develop/steer towards a higher, more negentropic, state.

Finally—with the work presented by Luhmann in his *Social Systems* from 1984 (Luhmann 1995)—we have based on what is called Luhmann's 'autopoietic turn' systems as isolated entities. However, in the vocabulary of Luhmann, such systems can enter into 'structural coupling' with each other—and be 'irritated' (i.e. affected)—but basically systems in his perception are to be seen as 'operationally closed'. I will give examples, but first we need to understand that Luhmann operates with four different types or categories of systems set out as follows (Ibid., p. 2):

- Social systems which are subdivided into: societies, organisations and interactions
- Psychic systems
- Organisms and
- Machines

For the upper three types of systems, Luhmann sees the autopoietic perception as relevant, whereas machines are categorised as allopoietic, i.e. their different parts or units are not maintained and produced by themselves during the operation of the machine—they are excluded as part of the machine system in such a way that they can be replaced if, for example, a certain unit is worn out. This is why the originators of autopoietic systems thinking, the Chilean biologists Varela and Maturana, see only living systems as autopoietic.

Social and psychic systems are prominent as concerns the attention they are given in Luhmann's work. Basically, these systems are characterised by their use of meaning, something which is not attributed to the categories of organisms and machines. For our purpose I will concentrate on the social systems category, but the perception of a system being 'operationally closed' can be illustrated in the psychic systems category: the nervous system of the brain is a self-referential, closed system consisting of neurons. An event does not directly determine neural activity, but may have an effect that can be seen as a kind of 'irritation'. The closed nature of the system is then not to be understood as a kind of preclusion but rather as a possibility for openness. The neural system does not mirror the surroundings but constructs an image of these through internal operations.

The basic features of autopoietic systems, briefly introduced above, make it possible for Luhmann to formulate highly interesting views on systems and complexity.

2.1.2 Systems and Complexity

It should be clear by now that due to his autopoietic turn Luhmann's approach to systems thinking differs in many ways from positions held by other researchers in the social science field, in this respect notably Habermas. The Danish philosopher and communication researcher Ole Thyssen has described the differences in the following way:

> *Autopoietic systems are outside each other and external to each other. They never overlap. Human beings are not part of society, and the society does not exist "for the purpose of human beings". Language and culture are not—as with Habermas—the sea in which human beings swim around and which comprises social and psychic systems, but tools to scan the streaming consciousness, to reduce the complexity and render communication probable by supplying the participants in speech with resources they swiftly and easily can draw upon.* (Thyssen 1992, p. 26 in transl.)

How can operationally closed systems interact?—This apparent difficulty is answered by seeing them as structurally coupled. This means that the systems are still to be seen as autonomous, but they make available their complexity in "temporary interlockings". In this way, through a kind of structured emergent system, the occurring open possibilities—i.e. "presupposed free, unbound material and energy, or the not-yet-fully-determined possibilities"—are to be used as providers of meaning (Luhmann 1995, p. 221).

As noted Luhmann subdivides social systems into societies, organisations and interactions. The interaction system appears simply when a group of people is together, for example attending a seminar at a university, and it is constituted by approval of agenda, oral presentations, a person in the audience talking with the person next to him during a break, etc. The actions and interactions of people outside the seminar room belong to the surroundings, or the system environment, of the interaction system. At the end of the seminar, the interaction system is dissolved, at least until the group of people meets again for a new seminar (Kneer and Nassehi 1997, pp. 46–47).

The organisational system forms another type of social system that is seen as organised when certain conditions are fulfilled with regard to being a member of the system. Organisations, such as public and private companies and enterprises—universities, engineering consultancies, kindergartens, IT companies, the Danish Royal Theatre, Wagner Societies and Greenpeace that may seem to go beyond this public/private demarcation—are all seen as organisations under Luhmann's perspective. This means they are engaged in determining "special courses of action", which could not be expected in the surroundings of the organisational system in exactly that way, which is how it becomes possible for members and

non-members of the organisation to get an understanding of it and act accordingly (Ibid., p. 47).

For Luhmann the most comprehensive social system is the societal system. All interaction systems and organisational systems belong to the societal system, but the societal system is not a kind of super-interaction system or super-organisational system; the societal system also includes actions between people who are not present together in a group, and people cannot resign their societal belonging. The societal system is made up of much more than the plenitude of interaction and organisational systems, which means—due to its multiplicity and variety—it becomes, according to Luhmann, a "system of a higher order, a system of a different type" (Ibid., pp. 47–48 in transl.).

A striking insight set out in Luhmann's theory is that the societal system is seen as functioning, among other things, for the purpose of reducing the complexity of the societal world. Where previous system conceptions have been concerned with the "system as more than its parts", Luhmann's conception implies "decentring" systems thinking by also seeing the "system as less than its parts". By this he means that we have no integrating way of interpreting social systems; there is no centre of social systems endowed with some kind of power, from where social systems could be reformatted. In fact the systemic world and systems as such are without a centre (Harste 1992, p. 64).

2.2 System and Environment

Luhmann perceives complexity as being forced to select. In fact, this is only the first step in a way of reasoning that points towards the concept of contingency which is essential for understanding current and future planning conditions. The meaning of contingency is laid down by Luhmann as follows:

> *Complexity, in this sense, means being forced to select; being forced to select means contingency; and contingency means risk. Every complex state of affairs is based on a selection of relations among its elements, which it uses to constitute and maintain itself. The selection positions and qualifies the elements, although other relations would have been possible. We borrow the tradition-laden term "contingency" to designate this "also being possible otherwise". It alludes, too, to the possibility of failing to achieve the best possible formation*. (Luhmann 1995, p. 25).

Recognising contingency as a condition of planning means recognising that many explanations and many alternatives are possible at the same time. Does planning not dissolve as a management strategy under such circumstances? What might at first glance look like a blind alley when we reflect upon the meaning of contingency and its possible influence on planning thinking, however, turns out to have a kind of "Midas touch" (Ibid., p. 44). Since contingency denotes states anywhere between what is necessary and what is impossible, the golden touch of Midas that Luhmann refers to as characterising it can be understood as the richness it makes possible in theorising about concrete manifestations in social systems;

these manifestations could have been otherwise and have led to other configurations with other interpretations, or with other understandings of these interpretations; other perspectives could have been chosen and in that case this or that consideration or reflection would change. When we supplement the view of the decentred approach to systems thinking with the views expressed above on the notion of contingency, we arrive at some of the basic analytical tools in Luhmann's treatment of social systems.

2.2.1 The Midas Touch of Contingency

A basic view expressed in Ashby's Law of Requisite Variety is that the variety in response from a system should match the variety of the challenge in the environment, see, for example, (Checkland 1981, p. 88). But at the same time it should be noted that according to Luhmann a social system is always less complex than its environment. So one might expect it, for instance, to be 'defensive' all the time as a strategy of coping with the greater variety surrounding it. However, according to Luhmann certain other possibilities exist. Noting first that temporal autonomy indicates the capacity of bringing "relationships of complexity into the form of meaning" by "actualising what is temporally not actual, with the risk of remembering and anticipating incorrectly", he outlines these possibilities as follows:

> *If the relative temporal autonomy of a system is secured by one or another combination of distancing mechanisms, then a system can use the temporal dimension to better solve the problems of its own complexity … and, above all, to increase its own complexity through the use of time. We will call this the temporalization of complexity …*
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> *Temporalization of complexity leads to a selective ordering of the connection between elements in temporal succession. In a more abstract formulation, the capacity to make selective relations can be greatly expanded if a system can establish an ordered difference between connections in temporal succession, a change of relational models according to internal and external demands.* (Luhmann 1995, pp. 46–47).

There seems to be some promise here for planning, if planning as a discipline and activity can enable and empower the system by proactively increasing its own-complexity so the system can better meet the upcoming challenges of contingency and otherwise. The conditions for planning in a complex society can generally be matched by its organisations, seen as a variety of socio-technical systems with the common characteristic, however, that their present state is occasionally overwhelmed due to contingency. Such situations can also loosely be referred to as 'information overload'.

From a societal viewpoint, contingency ensures compatibility among numerous subsystems—seen indirectly by the many rules and regulations *we do not need*—whereas from the viewpoint of a single social system, for example some kind of an organisation, contingency implies in principle that its 'deficit' in system complexity, compared with the complexity of its environment, will cause the

system to be 'on alert' all the time. Being on alert on this basis and acting in accordance is what management is about. SP, at least in those contexts where this type of approach may be applied, can be seen as one of the tools available for management, but an important one, as it is precisely aimed at assisting the management and the organisation in facilitating what Luhmann calls the temporalization of complexity.

Systemic planning, therefore, has a role that in some ways is different from conventional planning: while the latter aims at controlling the 'march into the future'—seen as part of the present system's environment—SP accepts that this environment is to some extent uncontrollable. More practice-oriented, it makes use of a framework and methodology that make the organisation better prepared *to meet* the future by recognising both its 'knowns' and its 'unknowns'.

2.2.2 Contingency and Decisions

Organisations need to produce decisions. Before a decision, we have contingency represented as open options. Afterwards, we have contingency now relating to the options closed and what the decision means in terms of change. So we can look upon a decision as a transformation of contingency where "uncertainty is changed into risk", because there is always uncertainty about what will follow and whether a decision can really be carried through or will be resisted, either by factors actualised due to the alternatives foregone or more simply because some surprises will appear (Thyssen 1997, p. 75). There is no way in which the organisation can avoid making decisions because not acting should also be seen as a decision. Everything in an organisation is successively being created by the organisation as the result of ongoing decision making which is in need of decision support. Planning provides one kind of decision support. The picture of the environment that is used when taking the decision is not part of the environment, but part of the organisation as *it is constructed* by the organisation. It is such a construction that underpins the decision and as such it is the responsibility of the management (Ibid., p. 85).

Since we live in a complex world, we cannot know everything. How should we? But does that mean that the management is free of responsibility? When nobody knows the consequences, how can we blame anybody? There seems, however, to be a kind of paradox here as stated by Thyssen in the quotation below:

> *Non-knowledge seems to free people from responsibility, because how could one be responsible for something that one in principle cannot know about? Nevertheless, it is precisely therefore decision-makers are hired. We do not accept that they overplay their non-knowledge and make themselves victims of the circumstances. Their task is to undertake the responsibility and risk of the decision. Part of this is to construct the space and time of the decision—its frame …* (Thyssen 1997, p. 85 in transl.).

The function of systemic planning is precisely to assist in such a construction in cases where the organisation faces a complex planning task.

In the following the organisation will be perceived as a socio-technical system. Of the many decisions defining the specific organisation some will relate to strategic issues, and where these are set in a context of complexity, for example by having long-term consequences and influenced by interwoven global/local (the glocal) factors, the organisation will as part of its strategic work face future-oriented problems involving complex strategic choices. To examine the possibility of supporting the decision-makers of the organisation in this respect is the main focus in this book for which reason it is necessary to address *how the socio-technical system is related to its future*. As regards the treatment below this may be referred to in the plural as its futures.

2.3 The Socio-Technical System and Its Futures

The British management theorist Ralph Stacey has set out a relevant schema for addressing different types of change. As noted in Sect. 1.3 Stacey perceives business units as complex, dynamic systems. Altogether he operates with three types of change: closed change, contained change and open-ended change, as described below (Stacey 1993a):

Closed change. The key features of closed change are unambiguous problems, opportunities and issues, clear connections between cause and effect, and the possibility of accurately forecasting the consequences of change. Faced with such change, people tend to behave in easily understandable ways. The decision-maker can make use of rational decision-making techniques, and the processes of control are formal, analytical and quantitative. There is a clear purpose with clear preferences and alternative ways of achieving the purpose are known.
Contained change. The key features of contained change derive from those change situations where it is possible to make probabilistic forecasts based on actions taken now and their most likely consequences. This is made possible because the consequences appear to some degree as repetitions of what has happened in the past or they relate to large numbers of essentially the same event. As a manager looks into the future, accurately predictable, closed change declines in relative importance, while less reliably predictable, contained change increases in relative importance.
Open-ended change. Control in open-ended situations in practice means something completely different from what it means in closed and contained situations. In such situations, the future consequences are unknown and forecasting is totally impossible due to an ambiguous purpose or equivocal preferences of the actors involved. The whole situation being confronted is ill structured and accompanied by inadequate information, more or less subjective, and conditioned by personal ambitions, beliefs and values. There are problems with interpreting data and applying statistical techniques in uniquely uncertain conditions, for which reason forecasting and simulation become problematic. In open-ended change situations we do not know the consequences of what we are doing until we have done it.

The latter statement about not knowing the consequences in advance of actions to be taken is really one of Stacey's strong points. His considerations have led him to speak about the "unknowable". His viewpoint is expressed in the quotation below:

> *Everyone admits that the future is basically unknowable, particularly in the case of an innovative product or course of action. This prospect, however, makes many managers uncomfortable, and they then ease their discomfort by assuming that even innovative futures are nonetheless approximately knowable. One can at least, they say, have a vision or make some assumptions about the long-term future. One can give shareholders, or others in a controlling position, meaningful information on future rates of return and risk levels.*
>
> *I argue that this is a soothing fantasy that distracts attention from, and weakens the resolve to deal with, the real world. Instead of sidestepping the issue of unknowability, managers must learn to face it head on. That means accepting that you really have no idea what the long-term future holds for your organisation; forming visions and making assumptions are not realistic possibilities. It means accepting that no individual or small group can be in control of an organisation's long-term future …* (Stacey 1993b, p. 7).

One can agree with many of Stacey's findings in his comprehensive writings about organisations and issues relating to change (Stacey 1993a, b; Stacey et al. 2000). However, I cannot agree with his very principal meta-finding quoted above that one should recognise and accept that no individual or small group can be in control of an organisation's long-term future. On the contrary, the viewpoint argued in what follows is that proactive effort—seen as planning in its broadest terms and handling complex strategic choices properly—is worthwhile. What is basically meant by this is that it is necessary to scrutinise the consequences of an action in advance of any concrete action when the consequences can be identified and assessed. This is exactly the job of managers assisted by planners and decision analysts.

Conventionally such a mapping of consequences has relied in a comprehensive way on modelling and quantitative assessment, in this book referred to as systematic planning. This conventional—systematic—perception of planning implies causality: if these means are used in a specific way, certain ends will result from—or be caused by—the set of planned actions. Such "if then" thinking belongs to the generic idea of planning and strategy development.

However, since chaos and complexity theories entered management thinking in the 1990s, the concept of causality in socio-technical systems has been under attack. Above I used the work of Ralph Stacey to exemplify what may come out of basing management thinking on these new theory constructs. I could have chosen several authors of management literature, but Stacey's books about chaos management published in the early 1990s stand out due to their penetrating insights about organisations and not least their in some respects radical conclusions (Stacey 1993a, b). For our purpose here, seeking to come to terms with planning under complex conditions, I highlighted the finding from this type of literature that no individual or small group can be in control of an organisation's long-term future. This is certainly not the common belief among board members and CEOs and

therefore there is a need to dig deeper into this question. Summarising in Chap. 8 some plausible answers will be presented based on the findings throughout the pages.

With a focus now on causality, I will make use of Stacey's more recent work about complexity and management (Stacey et al. 2000). Due to debates with several well-known researchers in the field, among others Jonathan Rosenhead, Stacey's argumentation on the implications of chaos and complexity theories for management has somewhat changed. Stacey and his collaborators now recognise that a deterministic, chaotic system may not resemble the ongoing affairs of human organisations where many uncertainties could better be comprehended as being of a stochastic type. The early writings of Stacey—those used to introduce the concept of dynamic complexity in Sect. 1.3—focus some attention on the idea of the "unknowable future" to be accepted on the premises chosen; we may see the more recent book from 2000 by Stacey, Griffin and Shaw as a continued examination of the unknowable which is, among other things, carried out by digging deep into the concept of causality. In fact the book, entitled *Complexity and Management*, contains a thorough description and interpretation of causality in Western thinking from Aristotle to the present day, in which, for example, the theories of self-organisation worked out by the Belgian physicist Ilya Prigogine and others are dealt with.

The major finding of Stacey and his collaborators centres around the concept of "transformative teleology". This is contrasted with the concepts of "formative teleology", which are concerned with the actualisation of form or self already there in some sense and "rationalist teleology" concerned with realising chosen, pre-set goals. "Telos" is the Greek word for goal or end, so teleology can be understood as preoccupied with the overarching source of change (Ibid., p. 196). We can get an understanding of the causal framework Stacey and his collaborators associate with transformative teleology from the following quotation:

> *When Prigogine considers the wider implications of his work, we think he makes a clear move to Transformative Teleology. At the beginning of his book, The End of Certainty (1997), he poses what he sees as a central question: "Is the future given, or is it under perpetual construction?" In the terms we are using, this translates into "Is causality in nature (including humans) better understood as Formative Teleology, or is it better understood as Transformative Teleology?" His answer to the question is very clear: he sees the future for every level of the universe as under perpetual construction and he suggests that the process of perpetual construction, at all levels, can be understood in nonlinear, nonequilibrium terms, where instabilities, or fluctuations, break symmetries, particularly the symmetry of time.* (Stacey et al. 2000, p. 97).

The breaking of time symmetry plays an important role in the more technical parts of Prigogine's work (Prigogine and Stengers 1985, pp. 249–341). The interest pursued by Stacey, Griffin and Shaw, however, is in exploring their conceptual implications as expressed in the quotation below:

> *[Prigogine] says that nature is about the creation of unpredictable novelty where the possible is richer than the real. When he moves from focused models and laboratory experiments to think about the wider questions of evolution, a move that many scientists would question, he sees life as an unstable system with an unknowable future in which the irreversibility of time plays a constitutive role. He sees evolution as developing bifurcation*

> *points and taking paths at these points that depend on the micro details of interaction at those points. Prigogine sees evolution at all levels in terms of instabilities, with humans and their creativity as part of it. For him, human creativity is essentially the same process as nature's creativity and this is the basis for his call for "a new dialogue with nature". These features, unknowable futures emerging in here-and-now interactions, are essentially what we have defined as the causal framework of Transformative Teleology.*
>
> *Central to Prigogine's approach, at all levels, is the distinction between individual entities and populations, or ensembles, consisting of those entities.* (Stacey et al. 2000, p. 97).

When the self-organisation phenomena are interpreted later in the text with emphasis on human organisations, the following conclusion is reached:

> *… the dominant management discourse, including systems thinking, is built, explicitly or implicitly, on Rationalist Teleology as an explanation of choice … This is expressed in psychological theories that accord priority and primacy to the choosing individual over the social. It is a view of minds as information processing devices that make representations of a pre-given world, formed into maps and models that are the basis of subsequent action. Alternatively, individuals may be thought of as having deep, true identities and they are motivated, ultimately, by contexts that allow them to express their true natures. The social—that is, the cooperative and competitive relating between people—is important as an enabling context …* (Stacey et al. 2000, p. 181).

The shift in understanding of causality invoked with the perceived causal framework expressed in transformative teleology is remarkable. From the primacy of a choosing individual, we shift to a view that emphasises the context of the social by which people are motivated. In model language, one may say that the actions at the micro-level cannot be aggregated as if it were to produce a representation of the social. Instead, the micro-level and the social, as different and separate entities, interact in a self-organising process of change. In specific domains we may see concrete outcomes as being sympoietic, i.e. produced/created in an interplay between the micro-level and ensembles we can refer to, dependent on context, as either a meso- or a macro-level. Later on we will make use of these insights by introducing in SP theory the concept of *subworld* and in SP practice the *decision conference* as an operational arena for the unfolding of SP and strategic decision making.

With a basic view of an organisation as a socio-technical system that undergoes a transformative change towards its futures (being in the plural until realised) and such change seen as related to the making of important system/environment distinctions (at least for some strategic decisions related to situations with complex strategic choices involved) systematic planning has to be renounced as being at best insufficient; in some cases it may even be counterproductive. At the end of Sect. 1.1 a framework for systemic planning was introduced as four interlinked levels, of which level 1 concerned coming to grips with complexity by combining complementary ways of seeing as two basic epistemic lenses for SP. This chapter has served to encircle the condition of complexity. The next chapter on linking complexity with simplicity will serve—by adding to this chapter—to finalise the filling-in of the SP framework's level 1.

Main points and findings of this chapter

- Complexity and its meaning can be understood by making use of social systems theory as developed by Niklas Luhmann. Luhmann is difficult to read for a newcomer to his 'systems world'. Certain of his insights are, however, important: A plurality of realities is created through cognition; cognition produces reality by producing system/environment distinctions. These insights are a backdrop for the stage-wise construction of SP principles and methodology described in the following chapters. Their function may become visible already now if "reality" above is replaced by "decision knowledge".
- The nature of complexity—a central theme in Luhmann's writings—is reflected upon by him by introducing concepts such as autopoiesis and contingency. For this context it suffices to note that a theory of action is offered by Luhmann's systems thinking which *is not* based on a transparent knowledge of the system's functioning. According to Luhmann system changes are basically contingent and aim to reduce complexity.
- Complexity is interwoven with open-ended change and according to Ralph Stacey open-ended change cannot be predicted or modelled by use of causal relationships. Open-ended change is an expression of self-organisation.
- On this theoretical basis companies and organisations can be seen as socio-technical systems that when they engage in strategic decision making have to confront the complexity that is representative of the systems world they belong to. With strategic decision making as an expression of a socio-technical system engaging in open-ended change, the planners and decision-makers are in need of what is later on in the book referred to as choice intelligence. How such a kind of intelligence is obtained is dependent on chosen applied epistemic lenses (Chap. 3), how knowledge and competencies can increase (Chap. 4) and how particular insights of importance relating to the concrete planning task can be achieved through adequate use of different modes of enquiry (Chap. 5).

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