WHITE PAPER

SYSTEMS THINKING AND FOUR FORMS OF COMPLEXITY >

PHILIPPE
VANDENBROECK

JUNE
2015

shift n
clarity in complexity

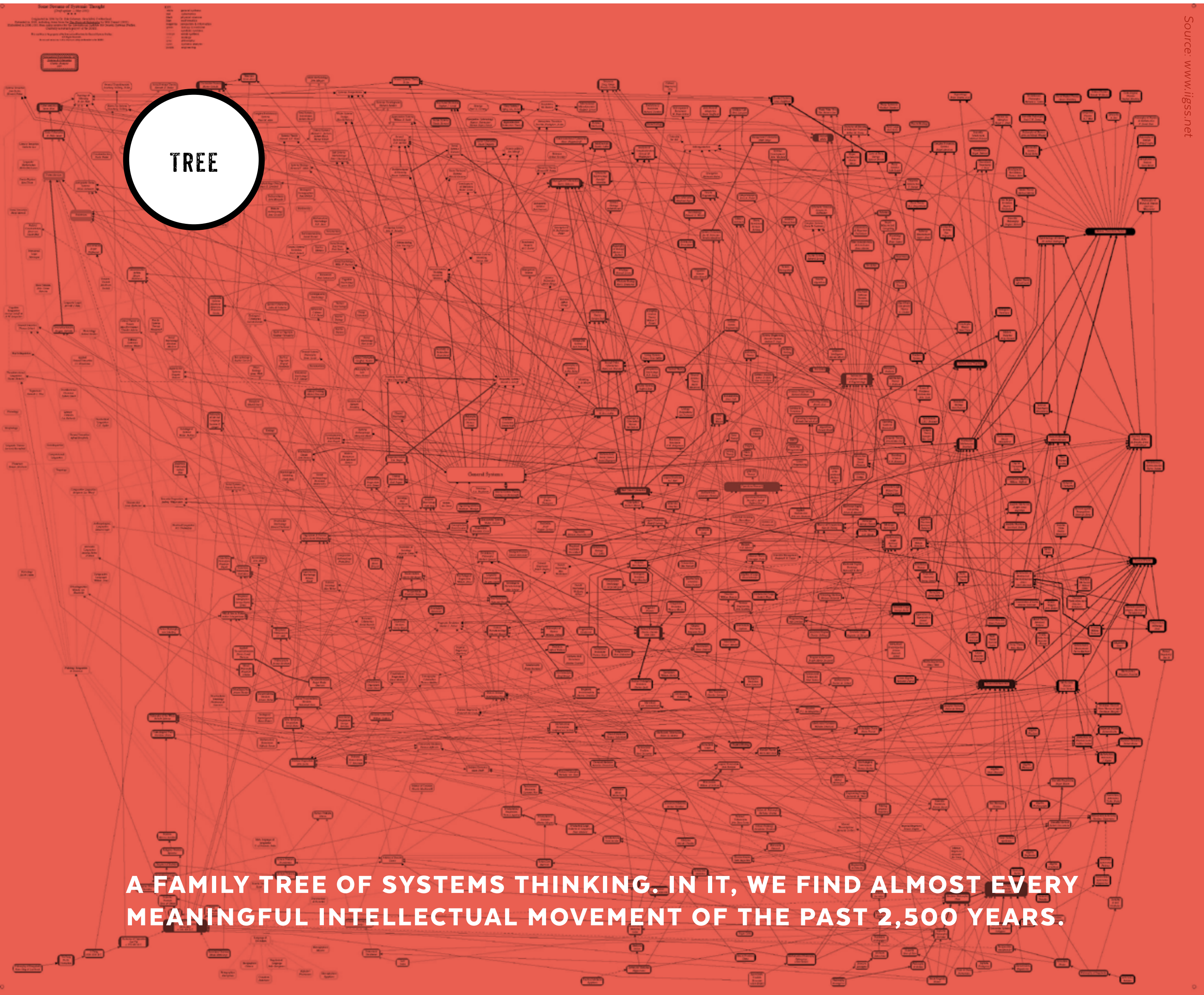
BIO

PHILIPPE VANDENBROECK

Philippe Vandenbroeck
is co-founder and Partner
at shiftN.
www.shiftn.com/about

CONTENTS

Systems thinking is on the rise. Even so, there are many misconceptions about what it is. Perhaps this shouldn't come as a surprise because, paradoxically enough, systems thinking is not a well-defined intellectual discipline. The International Institute for General Systems Studies (IIGSS) once produced a family tree of systems thinking in a poster, which was a bewilderingly dense network of family relationships (2001). At its base, we find Babylonian astronomers and Pre-Socratic philosophers. The top has thinkers from the fields of chaos theory, computational linguistics and complexity economics. In between, we find almost every meaningful intellectual movement of the past 2,500 years. Other representations mirror the same basic picture: a multidisciplinary tangle of sciences leading to a broad 'delta' of approaches to systems, with all kinds of secondary movements and schools.



A FAMILY TREE OF SYSTEMS THINKING. IN IT, WE FIND ALMOST EVERY MEANINGFUL INTELLECTUAL MOVEMENT OF THE PAST 2,500 YEARS.

Source: www.iigss.net

The development of systems thinking is not finished, which in part explains why the discipline appears so fragmented to us. In this interlude, we have endeavoured to give an overview of the most important manifestations of systems thinking in the past sixty years. Our guiding principle is the question of how this thinking approaches our complex reality. We make a distinction between four forms of complexity that also help shed light on different dimensions of systems thinking: dynamic, architectural, relational and generative complexity. But we will begin by providing some history and terminology.

A PARADIGM SHIFT

In our intellectual history, the new horizon of systems thinking opened up as a reaction to an existing dominant way of thinking. Starting in the 16th century, the natural sciences really took off. This contributed to the *deenchantment of the world. "The central task of a natural science is to make the wonderful commonplace: to show that complexity, when correctly viewed, is only a mask for simplicity; to find pattern hidden in apparent chaos."* (Simon 1996:1). **Systems thinking is a rebellion against the objectionable habit of reductionist sciences to suppose that there is always some order hiding behind the disorder of the visible world.** It aims to restore complexity's honour and has placed the phenomenon at the heart of its project. Complexity, according to the eminent scholar Edgar Morin, is an intimate mixture of order and disorder. He describes this as a web *(complexus:* what is entangled, interwoven) of events, interactions, feedbacks and coincidences that determine our visible world. This heterogeneity inevitably involves uncertainty and ambiguity. We might want to pretend this uncertainty doesn't exist, but this intellectual blindness ultimately causes more problems and more suffering (Morin 2008).

MORIN, E. (2008). *On Complexity. Creskill,* New Jersey: Hampton Press.

The IIGSS family tree indicates that systems thinking was already potentially present at the beginning of humanity's philosophical adventure. But the origins of contemporary systems thinking can be pinpointed to the turn of the 20th century. That was when fresh ideas and a new lexicon around complexity emerged. Concepts such as *ecology* and *holistic* were being coined at that time. People started thinking about whole systems whose functions could not be understood by analysing them in terms of component parts. A short time later developments within quantum mechanics, namely the *uncertainty principle,* pointed to the presence of ambiguity in the building blocks of the universe. Gödels mathematical *incompleteness theorems* confronted us with inherent limits to provability in mathematical theorems. In this way, the sense of complexity and uncontrollability worked its way through all kinds of cracks back into in the sciences that it had been banished from a few centuries earlier.

Systems thinking gained momentum soon after World War II. A motley band of engineers, mathematicians, biologists, neurologists and psychologists thought about communication processes in machines, animals and people and formalised notions such as feedback and self replication (Pickering 2010). By the end of the 20th century, complexity science provided new insights in the areas of nonlinear dynamics and the self-organising ability of complex physical, biological, and social systems (Nicolis and Prigogine 1989; Johnson 2002).

PICKERING, A. (2010). *The Cybernetic Brain. Sketches of Another Future.* Chicago: The University of Chicago Press.

NICOLIS, G. & PRIGOGINE, I. (1989). *Exploring Complexity: An Introduction.* New York: W.H. Freeman and Company.
JOHNSON, S. (2002). *Emergence. The Connected Lives of Ants, Brains, Cities and Software.* New York: Scribner

These are major steps in a paradigm shift that is still in full swing: *"The paradigm of simplification dominates our culture today and the reaction begins against its stronghold. But we can't pull it out and I can't pull it out; I can't pretend to pull a paradigm of complexity out of my pocket. A paradigm, although it must be formulated by someone – by Descartes, for example – is, fundamentally, the product of an entire cultural, historical, civilizational development (...) We are in an uncertain battle and we don't know who will win."* (Morin 2008:51)

SYSTEMS AND THEIR ENVIRONMENT

A brief description of the basic notion of a system is given below. We can give the following definition: *"an integrated whole of which the essential properties emerge from the relationships between the component parts"*. The word is derived from the Greek *synhistanai: "to place together"* (Ison 2010:22). First of all, this teaches us that a system is a *whole,* an entity that an observer can cognitively dissociate from a context. We also find this intellectual reflex of making a distinction between the entity and its environment in classical sciences.

ISON, R. (2010). *Systems Practice: How to Act in a Climate-Change World.* London: Springer

However, what is characteristic of systems thinking is that this entity is a collection of elements that are connected to each other in a certain way. A system therefore exhibits a certain form of organisation that determines its individual character. The British systems thinker Gregory Bateson playfully put this insight as follows:

"You have probably been taught that you have five fingers. That is on the whole incorrect. That is the way language subdivides things into things. Probably the biological truth is that in the growth of this thing, in your embryology, which you scarcely remember, what was important was not five but four relations between pairs of fingers." (Bateson 2001) In other words, assigning an entity to the class of systems called 'hand' is determined from the perspective of a systems thinker more by a specific form of organisation than by the observation that a hand happens to have five fingers.

BATESON. N. (2001) *An Ecology of Mind. A Daughter's Portrait of Gregory Bateson.* The Impact Media Group.

A third important element in relation to the definition of system is its closed or open character. In systems thinking, we are primarily interested in the latter. A *closed* system, such as a rock or a chair, is in a state of equilibrium: there is no exchange of material or energy with the environment. An example of an open system on the other hand is a living being: this organism will disintegrate without a flux of energy. An important implication of this is that the system's coherence lies not only within the system itself, but also in its relationship with the environment. *"Reality is therefore as much in the connection (relationship) as in the distinction between the open system and its environment."* (Morin 2008:11) The environment of an open system is therefore both necessary and foreign at the same time.

DEALING WITH DYNAMIC COMPLEXITY

A quick search for 'systems thinking' on the internet usually leads to sources that discuss a sub-discipline of systems thinking, namely *system dynamics*. It is perhaps the branch of the systems thinking tree that has the most obvious applications. Since the beginning of the 1990s, Peter Senge, director of the Center for Organizational Learning at the Massachusetts Institute of Technology (MIT), has been one of the major contributors to popularising system dynamics by applying it to bottlenecks in organisations, management, education and other social domains (Senge 1990). However, it is a misconception to think that system dynamics it the same as systems thinking. It is only part of it.

SENGE, P. (1990) *The Fifth Discipline: The Art & Science of the Learning Organization.* New York: Doubleday.

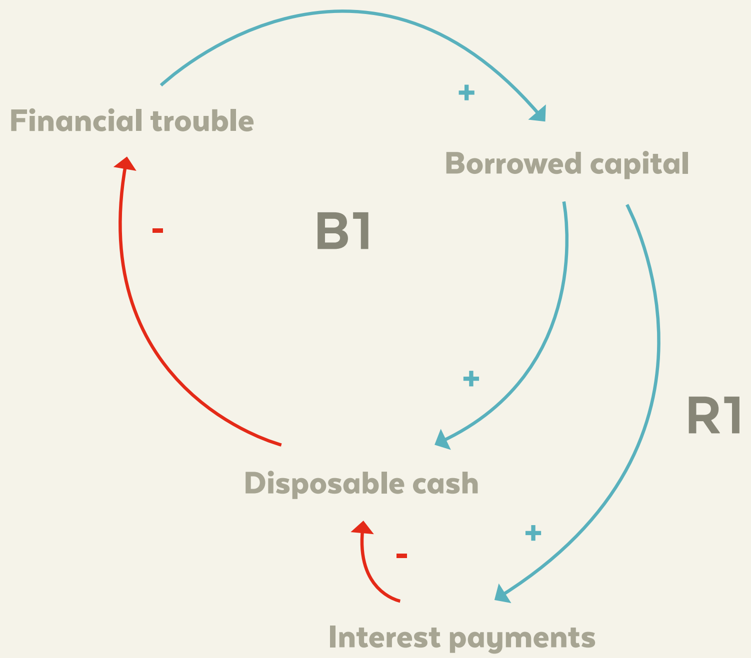
System dynamics has emerged as a powerful mathematical toolbox to model the dynamics of complex systems. A pioneer in this domain was Jay Forrester, who was also a researcher working at MIT. He began modelling industrial processes as early as the 1950s, and processes of urban growth not long after that. A very ambitious system model which gained a lot of attention was the World2 model, which makes it possible to study the interactions between population, industrial growth, pollution, food production and resource stocks at the global scale. In a more advanced form, this model was used in the Limits to Growth simulation, the results of which were published as a report to the Club of Rome (Meadows et al 2004). This study caused quite a stir because it postulated that without policy changes, exhaustion of resources at the beginning of the 21st century could lead to a drastic contraction of industrial production.

D.H. Meadows, J. Randers and D. Meadows (2004) *The Limits to Growth: the 30-Year Update*, Chelsea Green Publishing.

> Today, system dynamic models are used in many different fields. Consider for example the emergency ward of a hospital, where many factors act together to influence the equilibrium between the ever-changing demand for medical assistance and how it is provided. If the interactions between these factors are managed properly, the waiting times for patients are reduced, the quality of care increases, and the people and resources present in the ward are used efficiently. Dynamic simulations of systems enable us to explore the effect of specific interactions between internal factors such as staffing and external factors such as the socioeconomic composition of the population in the area of the hospital. The models can also be used like a *flight simulator* to train department heads. By playing with the input variables of the simulation model, they get a feel for the dynamics of important output variables such as waiting time and quality of care.

System dynamics understands the behaviour of a system as the result of cause and effect relationships between elements of the system. Elements are things – stocks or variables – whose levels can increase or decrease, such as the quality of care or the temperature in a room. What makes system dynamics special is that it reasons in terms of feedback (Meadows 2008).

MEADOWS. D.H. (2008). *Thinking in Systems. A Primer.* London: Earthscan.



WHAT MAKES SYSTEM DYNAMICS SPECIAL IS THAT IT REASONS IN TERMS OF *FEEDBACK*.

These are circular causal chains that are very important for the behaviour of a system. For example: if the variable 'financial trouble' in a family is high, then something can be done by increasing the variable 'borrowed capital'. The injection of borrowed money into the family budget increases the amount of disposable cash and lowers the level of the variable 'financial trouble'. This is an example of *dampening* or *negative* feedback that pushes the system back to an equilibrium state (financial trouble = 0). But there is a chance that this effect will only be temporary because the variable 'interest payment' will increase – although with a certain delay. This puts the family budget back under pressure, and financial trouble will increase. The causal chain: increased financial trouble > increased borrowed money > increased interest payments > reduced disposable cash > increased financial trouble is an example of *reinforcing* or *positive* feedback, which pushes the system farther and farther away from the equilibrium state 'financial trouble = 0'.

Complex nonlinear dynamic systems can be simulated by integrating feedbacks and delay effects. This is the major contribution of system dynamics. As we have said, Senge worked on introducing this way of thinking into the management world. He says that the internalisation of these ideas encourages more reflexive leadership in practice. This addresses strategic and organisational bottlenecks from a holistic perspective and pays more attention to complex cause-and-effect relationships. This contributes to better decisions and a culture of *learning organisation*.

We will also give some attention to another branch of systems science under dynamic complexity, namely ***chaos theory.* This knowledge domain also specifically aims to understand complex, nonlinear system dynamics.** However, chaos theory has little in common with system dynamics in terms of methodology. It is a mathematical theory that explains why there are systems that exhibit behaviour that can be described as *deterministic chaos*. This means that the apparently chaotic behaviour can still be described precisely using a computation rule or algorithm. Sometimes very simple systems still seem to be able to exhibit very complex behaviour. For example a double pendulum (a pendulum with a second pendulum attached at the end) is a simple physical system that exhibits chaotic behaviour. This type of behaviour is strongly dependent on the initial conditions of the system. Even small differences can lead to very different behaviour in the short term.

This is the meaning of the popular metaphor of the *butterfly effect:* the flapping of this small animal's wings can influence the initial conditions of a meteorological system such that a tornado can change its path on the other side of the planet.

Chaos theory has been used to successfully explain complex behaviour within many disciplines including economics and the social sciences. The apparently paradoxical link between simplicity and complexity, of accurate description and behavioural uncontrollability, has led to chaos theory finding broad resonance well beyond academia (Gleick 1987).

GLEICK, J. (1987). *Chaos. Making a New Science.* New York: Penguin.

DEALING WITH ARCHITECTURAL COMPLEXITY

We will now shift our attention from the horizontal network of cause and effect relationships to the vertical axis of hierarchy as an organising, architectural principle. One of the metaphors that is often associated with systems thinking is the *iceberg* (Senge 1990). This image is evocative because everyone knows that most of the iceberg is underwater, and therefore unseen. The analogy with our observation of the visible world around us is obvious: what we see happening around us is only a manifestation of patterns and structures that are below the surface of the water and cannot be observed directly. The iceberg is therefore a model for a hierarchy of levels of understanding. The visible tip of the iceberg is the visible reality of observable events. We can point to them as the results of system behaviour understood as a set of repeating patterns of cause and effect. These patterns in turn take on meaning against the background of structural factors, namely the way in which gradually changing social regimes and institutions function, and the often unspoken beliefs, values and standards that guide how they function. In the hierarchy of explanations of events, patterns and structures, the lower level (of the iceberg) gives context and meaning to the higher level.

> This idea was developed further by Donella Meadows (2008) – one of the coauthors of *Limits to Growth* – into a *systemic ladder* with twelve levels of understanding. The ladder is very strongly inspired by system dynamics and contains leverage points that look at, among other things, the available stocks, feedbacks and information flows in the system. As we climb higher on the ladder, the leverage points increasingly look at ubiquitous, slowly-changing aspects of the system. The dominant paradigm within a community that gives meaning to all the underlying levels (in the iceberg metaphor, this limiting factor is therefore at the bottom) is placed at the top of the ladder. The hierarchy of leverage points is a useful instrument because it provides a vocabulary to think about changes in systems that is more nuanced than we usually use. But as a thought framework, it is still indebted to a linear bottom-to-top logic.

With the introduction of the concept of *recursion* as a structuring principle, this linearity is interrupted. In a recursive process, products or effects are also the source of what produces them. Take an individual who forms part of a community for example. The individual coproduces the community in interaction with other people. But the community is more than the sum of the people who comprise it. They exhibit behaviour and characteristics that cannot simply be explained from the component parts. At the same time, society also consists of the people who belong to it through language, upbringing and education. There is therefore mutual interdependence between the whole and the component parts. We could follow analogous reasoning with regard to the relationship between the person as a living being and the cells that form their body. Again, we can see the person as a product of interacting cells that exhibit very specific *emergent properties*. At the same time, the person as a biological entity provides a habitat within which these cells can thrive.

The concept of recursive organisation deviates from the linear relationship between product and producer, part and whole, sub and superstructure. Instead, it draws our attention to cycles of mutual influence that are self-supporting, self-organising and self-producing. That idea has been very influential in the thinking about processes of change in complex systems.

For instance, systems ecology developed the concept of *panarchy* that led to new nature protection practices (Gunderson and Holling 2002). An ecosystem is conceived as a hierarchy of system elements that operate at different scales of space and time. For instance, the reproductive cycle of a certain species of animal is a local occurrence with a fixed, relatively high frequency. Climate change is a more gradual, supra-regional process. There are all kinds of adaptive processes at a given scale level that have their own character, but which also interact with processes at other scale levels. In this way, these interwoven, inter-level feedback processes form a *complexus* which is referred to as *panarchy*. Many forms of management fail because they only focus on one scale level. The dynamic interactions with lower and higher scale levels are not recognised, as a result of which interventions in an ecosystem often destabilise it further.

GUNDERSON, L. & HOLLING C.S. (Eds.) (2002). *Panarchy. Understanding Transformations in Human and Natural Systems.* Washington: Island Press.

It is also essential in environmental management to recognise that ecological and social systems inextricably interact with each other. The concept of panarchy is therefore part of a description of *social-ecological systems* (SES). Furthermore, human intentionality and interests also come into play, but more about that in the next section.

DEALING WITH RELATIONAL COMPLEXITY

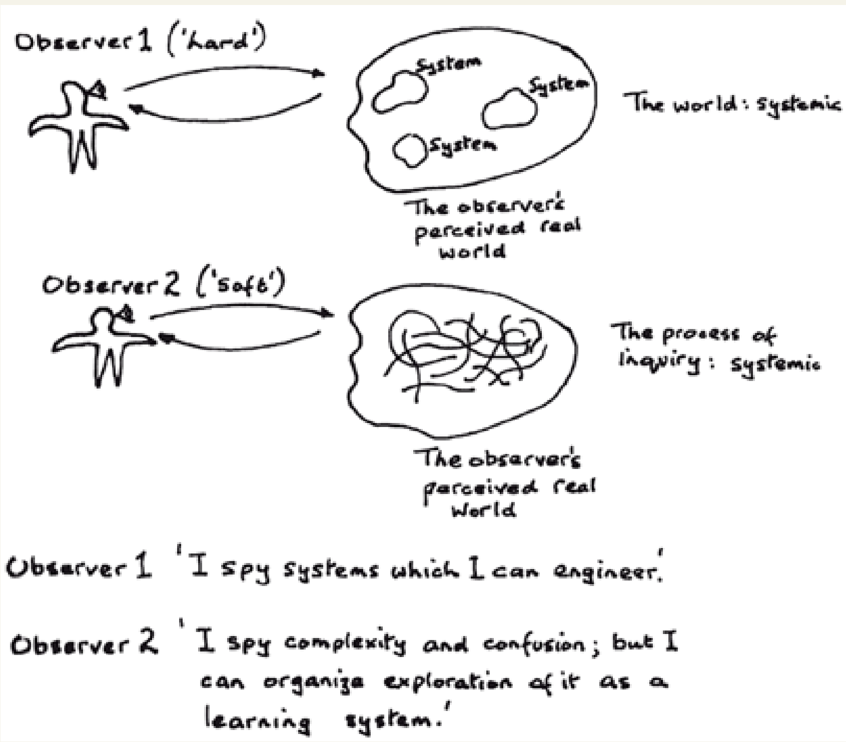
We have seen how systems thinking gives us new ways to think about complexity, with concepts such as *feedback* and *recursion* playing a crucial role. But we are now making a major shift in perspective, because **a lot of the complexity in our world is not necessarily related to demonstrable problems, but rather with how we deal with these problematic situations.** A person like Senge understood that a systems-dynamic model can play a role that goes further than merely making cause-and-effect relationships explicit in a rigorously defined system. The model functions in a social and institutional context and can form the background for a new type of dialogue between the actors who are affected by the difficulty. **Systems thinking then becomes a platform for organisational learning processes.**

However, system dynamics fundamentally remains a reflection of a *hard,* engineering approach to reality. The simulation models are often seen as a simplified but essentially still reliable, objective representation of the world. *Soft systems thinking* transfers attention from the systemic character of the reality to the systemic *process* to deal with this reality. Its use is effectively summarised by the title of the last book by Peter Checkland, the father of *Soft Systems Methodology* (SSM): *Learning for Action* (Checkland and Poulter 2006). In confronting complex challenges, systems thinking has the task of maintaining an ongoing learning process. That learning process must be marked by interventions in this complex reality with the purpose of improving problematic situations.

CHECKLAND, P. & POULTER, J. (2006) *Learning for Action. A Short Definitive Account of Soft Systems Methodology and its use for Practitioners, Teachers and Students.* Chichester: Wiley.

Soft systems approaches assume that an objective representation does not exist. Our perspective is always directed and filtered by our world view. Whether we like it or not, we only have a partial picture of the reality. When we are confronted by a problematic situation as an organisation or community, it is a challenge to align the partial pictures that the people involved have with each other enough to be able to take coordinated action. Models can help make our differences in perception visible, to map out common ground and to facilitate action. That is why SSM also uses models, but only to support a process of inquiry into and dialogue between different views of the world. To put it neatly: **hard systems thinking works on developing models of the world, while soft systems thinking focuses on developing *models for (intervention in) the world*** (Hoebeke 2000).

HOEBEKE, L. (2000). Festschrift Peter Checkland. In P. Checkland, *The emergent properties of SSM in use: a symposium for reflective practitioners, Systemic Practice and Action Research*, December 2000 Vol 13 Issue 6 pag 799-823.



Source: Checkland and Poulter (2006)

'HARD' VS 'SOFT', OR 'MODELS *OF* THE WORLD' VS 'MODELS *FOR* THE WORLD'

> Soft systems thinking gets much less attention than say, system dynamics, complexity science or chaos theory. An approach like SSM is very sober and lacks some of the glamour of the other systems approaches. It doesn't have any attractive tools associated with it or any visually appealing models. It his publications, Checkland only uses hand-drawn diagrams to emphasise its provisional and pragmatic character. The sophistication of SSM lies in the subtle use of language. For instance, we don't talk about 'problems' but about 'problematic situations'. The difference is subtle but important. *Problem* suggests a well-defined and agreed-upon fact that requires a solution. A *problematic situation* is a snapshot of the everyday stream of events that first needs to be given meaning, and then requires improvement. The same applies to 'consensus' and 'accommodation'. *Consensus* is static and supposes that everyone agrees about everything. An *accommodation* emphasises the provisional and even precarious character of an agreement between different interests and perspectives. SSM aims to use subtle differences of this kind to create space for a transparent and respectful learning process.

It is not easy for people to embrace the radical constructivist perspective that forms the foundation for soft systems thinking. Socioecological systems do not exist as such, but are always already informed by human intentionality. Soft systems thinking places a strong emphasis on identifying this intentionality, on making its normative dimension more explicit, and on working together to confronting these different views.

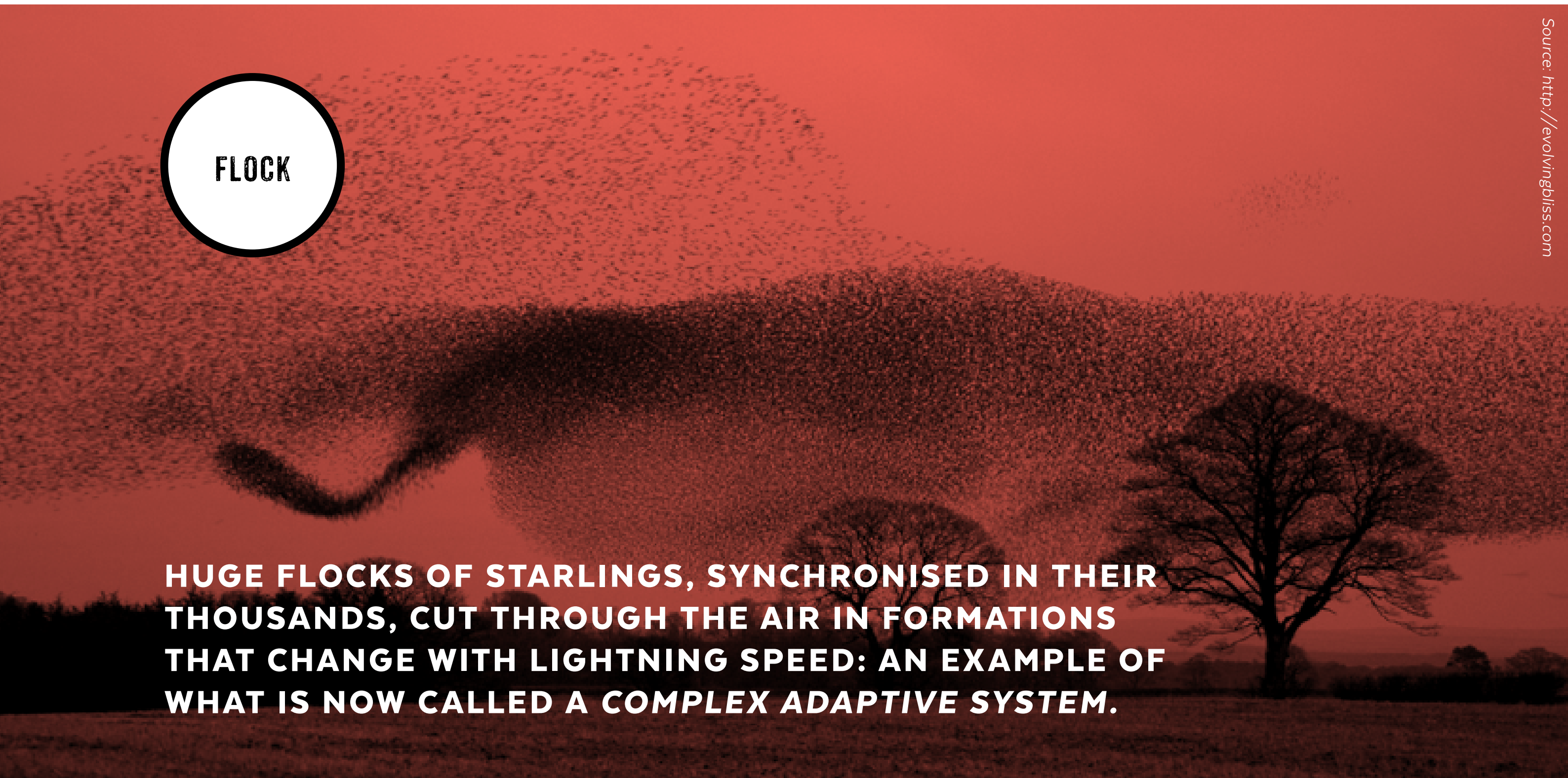
What is called *critical systems thinking* goes a step further into this. It provides tools to go into the critical inquiry of *boundary judgements* in more depth. As we have said, we only ever have a partial picture. Consciously or unconsciously, we distinguish important and less-important elements by making boundary judgements. Dealing with boundary judgements critically can have a double purpose: on one hand we owe it to ourselves and other interested parties to increase the quality of our interaction with complex issues through self-reflection and transparency; and on the other hand we can use boundary judgements in an activist way in opposition to parties who do not handle these issues with as much self-criticism (Ulrich 2005).

ULRICH, W. (2005). A brief introduction to critical systems heuristics (CSH). Web site of the ECOSENSUS project, Open University, Milton Keynes, UK, 14 October 2005, http://www.ecosensus.info/about/index.html [laatste geconsulteerd op 30 april 2015].

Soft systems thinking and critical systems thinking open a new chapter in handling complexity. The technical complexity of the problematic situation is explicitly linked to the social complexity in which this is necessarily embedded. The collaborative process of giving meaning must ultimately lead to action. This intervention results in effects that invite us to readjust our assumptions about the problematic situation. In this way, SSM helps to explicitly look at dealing with complexity as a learning process.

DEALING WITH GENERATIVE COMPLEXITY

Few natural phenomena can evoke the same mixture of enchantment and disbelief that fills an observer when they see the aerobatics of huge flocks of starlings. Synchronised in their thousands, they cut through the air in formations that change with lightning speed. How is this exceptional level of coordination possible? In the 1930s, people still considered the possibility of telepathy as an explanation. We now know that this astonishing order is possible because every bird in the flock respects a limited number of simple rules. The birds are attracted to each other *(cohesion)*, they move in the same way *(alignment)* and they try to avoid collisions *(separation)*. Using only these rules, it is possible to develop very realistic simulations of flocks of birds.



HUGE FLOCKS OF STARLINGS, SYNCHRONISED IN THEIR THOUSANDS, CUT THROUGH THE AIR IN FORMATIONS THAT CHANGE WITH LIGHTNING SPEED: AN EXAMPLE OF WHAT IS NOW CALLED A *COMPLEX ADAPTIVE SYSTEM.*

A flock of starlings is an example of what is now called **a *complex adaptive system*** (CAS; Miller and Page 2007). This **is a dynamic network of autonomous entities which interact locally. These entities can be animals, or just as easily cells, neurons, people or organisations. The order in the network is not coordinated centrally, but is the result of many micro-decisions that can be made at any moment by the agents that affect each other.** Feedback is therefore crucial to an understanding of this process.

MILLER, J.H. & PAGE. S.E. (2007). *Complex Adaptive Systems. An Introduction to Computational Models of Social Life.* Princeton: Princeton University Press.

The emergence of order at the macro level through the behaviour of actors/agents at the micro level is called *emergence* (Johnson 2002). That concept proved to be very fruitful in formulating a string of hypotheses to explain phenomena that classical, reductionist science could not get a handle on. The occurrence of *bubbles* in financial markets is a phenomenon of emergence as a result of local interactions between human agents. Today, we also see the occurrence of life in a similar light (Kauffman 1995). Living systems, including socioecological systems, are seen as a special class of complex adaptive systems. They are *autopoietic*. This means that they produce and maintain themselves (Maturana and Varela 1989).

KAUFFMAN, S. (1995). *At Home in the Universe. The Search for Laws of Complexity.* London: Penguin.

MATURANA, H.R. & VARELA F.J. (1992). The tree of knowledge: the biological roots of human understanding (Rev. Ed.), Shambhala.

The study of complex adaptive systems that can exhibit emergent behaviour is the domain of *complexity science.* This branch of systems thinking has gained prominence since the 1980s. Traditional science has always aimed to reason away complexity on the basis of manageable, macroscopic cause-and-effect relationships (it explains 'a lot from a lot'). The complex movements of the planets in our solar system were reduced to universal laws by Newtonian mechanics. However, complexity science thinks more in terms of a set of specific, local and generative rules that determine how agents react to each other and to a changing environment. The resulting behaviour at the macro level is self-organising, adaptive and can generate completely new manifestations. Complexity science explains 'a lot from a little'. And it opens the evolutionary horizon to a future that cannot be predicted in full (Phelan 2001).

PHELAN, S.E. (2001). *What is Complexity Science, Really?* Emergence, (3)1, 120-136.

Insights from complexity science have also prompted organisation experts to look at how emergence can be created in a strategically desired direction in social systems. The Belgian management expert Diane Nijs (2014) developed an 'imagineering' method that stimulates and orients the collective imaginative power of an organisation. A rich and suggestive meaning carrier specifically designed for this – a narrative – supports this process of transformation. This attractive narrative leads to new generative rules in a collective. New meetings take place, routines are modified, and resources are used differently. In this way, the organisation discovers new ways to create value. The balance of positive and

NIJS. D. (2014) *Imagineering the Butterfly Effect. Transformation by Inspiration.* Den Haag: Eleven International Publishing.

negative feedbacks shifts and the social system makes its way on a new evolutionary path.

Related to this, some methodical approaches to sustainability transitions include the development of a *Leitbild* for complex systemic change processes. An inspiring image of a desirable future, rather than purely a business problem analysis, is what motivates people to strive for something new.

CONCLUSION

We have sketched a rough overview of the field of systems thinking. To do this, we used four windows to indicate how systems thinking is different to a reductionist way of dealing with complexity. These perspectives cannot be neatly separated from each other; rather they overlap and mirror each other. It is like a hologram in which you can see the quasi-totality of the landscape from each angle.

It is clear that systems thinking is not a recipe book to solve thorny problems for once and for all. Morin (2008:97) puts it this way: *"… complex thinking is not omniscient thinking. It is, on the contrary, a thinking which knows it is always local, situated in a given time and place. Neither is it a complete thinking, for it knows in advance that there is always uncertainty. By the same token, it avoids the arrogant dogmatism which rules non-complex forms of thinking. Complex thinking, however, does not lead to a resigned skepticism, since, by completely breaking with the dogmatism of certainty, it throws itself courageously into the adventure upon which, from its birth, humanity has been embarked."*

We are perfectly able to make our way in a world that always holds something of itself back from our knowledge. We don't have to be crippled by this. We just have to be willing to admit it to ourselves.

COLOPHON

This paper was first published (in Dutch) in Jef Peeters (Ed.) (2015) *Veerkracht en Burgerschap. Sociaal Werk in Transitie [Resilience and Citizenship. Social Work in Transition],* pp. 107-117. EPO Uitgeverij. Antwerpen.