Chapter 4 – Health Systems Thinking and Social Systems Theory

In the last decade a lot of studies have been published under the banner of health systems strengthening or health systems thinking (HST). A Medline search using the term "health systems strengthening" finds 7804 articles from 2010 to 2021, an average of 650 articles per year. The search using "health systems thinking" gives 8324 hits (yearly average of 694) for the same period. This indicates the high relevance health systems themes have acquired. Acknowledging such prominent attention to the topic, in this chapter health systems thinking approaches are critically assessed in the light of Luhmann's theory of social systems.

In simple terms, health systems thinking is an attempt to bring together two sets of knowledge: on one side, the understanding of the characteristic attributes of health sectors, with their huge diversity of elements and relations (practices, diagnostics, treatments, technologies, specializations, stakeholders, structures, organizations, programmes, policies and so on); and on the other side, systems theories, with a plethora of approaches, methods and tools from diverse scientific fields. The chapter raises the question that a lot is not granted in the attempt to link these two universes. While the notion of a health system implies an acceptance of its mosaic-like outlook, without conceptualizing the gathering of parts of systems into a distinguishable unit, there is also a leap of faith in accepting methods and tools used in other fields (a collection resembling a *bricolage* itself), believing they offer the means to understand the nature of any health system.

The wide-ranging notions identified by HST as distinctive attributes of health systems include a number of features which are not interrelated or integrated into a comprehensive articulated whole. Among those notions of systems' characteristics we can list self-organization, constant changes, control by feedback loops, complex dynamics and non-linearity, time lags

between inputs and outcomes, resistance to change, historical dependence, critical stakeholders and contextual influences, policies and actions generating counter-intuitive and unpredictable effects, etc. (WHO 2009).

Definitions of health systems thinking related to tools and methods says that systems thinking is "a way to view the world using the general logic underlying various systems theory (e.g. general systems theory, chaos theory or complexity theory), informed by a wide range of relevant tools and methods (e.g. systems dynamics, modelling, structured conceptualization, or network analysis), the choice of which will largely depend on the question at hand, the context and available capacity" (Adam and de Savigny 2012).

The tools imported from other fields include boundary critique, soft systems methodology, critical systems heuristics, sense-making frameworks for problems, causal loop diagrams, social network analysis, human systems dynamics, process mapping, modelling systems dynamics, scenario techniques, outcome mapping, and so on (de Savigny et al. 2017). Harmonization and compatibility of all these notions, tools and approaches has not been attempted. Health systems thinking, as a knowledge territory, is therefore a patchwork of unrelated techniques and concepts. One is left with the impression that, lacking precise understanding of what a health system is, the field is open to absorb any tool from any scientific field that seems to help to fill the void.

As mentioned above, this merging of these two universes (health sector features and systems thinking tools) indeed remains a matter of good intention. The lack on both sides of a unifying theoretical body, which could help, on one hand, to visualize health systems' unit and, on the other, to see the combined validity of the tools to approach this rather multi-faceted object, is a major weakness of the health systems thinking endeavour. This chapter suggests that Luhmann's theory may contribute to overcome that deficit.

The discussion in this chapter therefore addresses the features presented as characteristic of health systems in the text *Health Systems, for Health Systems Strengthening* published in 2009 by the World Health Organization's Alliance for Health Policy and Systems Research.[1] Below, the systemic features identified by HST are listed and questions are raised. The second section of the chapter offers answers in line with Social Systems Theory perspectives.

1 This text has become the key reference in the domain of health systems thinking, with the characterization echoed in many subsequent works.

Questions

1. *Systems are resistant to change and systems are always changing* – How can researchers know at what measure they are dealing with resistance to change or with change itself? How can they distinguish whether they are looking at something that is changing or something that is resisting change, or indeed something that is doing both at the same time? And how about changes in the way the system resists change? Can these still count as resistance or change?
2. *Systems are governed by feedback loops* – When does a feedback loop have to be discontinued, modified, incremented, replaced, etc.? A stubborn feedback loop certainly leads any system to collapse. Something has to govern the feedback loop for the sake of achieving the system's objectives; what controls the feedback loop? Furthermore, how can governance dynamics be translated and analysed in terms of causal loops, when they often involve complex non-repetitive decision-making processes, which cannot be described as automated mechanisms?
3. *Systems are comprised of networks of nodes and ties, and networks take defining structures* – A number of questions can be raised in relation to systems and networks. How is the network's nodes and ties behaviour determined by the structure of the network when that structure itself is brought about by the behaviour of its nodes and ties? Is this a recursive phenomenon or just a tautology? How can a network incorporate changes into itself and respond to changes in the environment, and what drives it to do so? Will change unavoidably lead to the demise of the network in its current structure? How can this be predicted? A major weakness of the network theory seems to be its lack of incorporation of changing dynamics and factors.
4. *Systems are made of tightly linked parts, and changes in one are likely to have unforeseen effects in the other parts of the system* – Luhmann (2013) argues that complete interconnectedness and interdependence of all a system's elements is highly improbable. If that were the case, he says, all disturbance would require the entire system to be rebalanced anew; that would take a long time and would consume precious energy. It is therefore necessary to consider that the commonly held view of the integration of the system does not correspond to reality, and systems in fact develop internal specialized reactions and capabilities to isolate disturbances and solve them separately. The question should then be reformulated as how far a system separates or integrates its parts, and how vulnerable/resilient it might become in con-

sequence of that. What is better? To have tight internal connectedness or a certain degree of looseness, with parts performing adjustments independently? These are questions usually raised in relation to decentralization.

5. *Systems are counter-intuitive, have large numbers of elements interacting in non-linear fashion, and therefore have cause–effect relationships that may not be fully knowable* – That seems to be a reasonable understanding, supported by a non-explicit notion that complexity may include known unknowns as well as unknown unknowns. However, if that notion is adopted as valid, there are a number of implications to be considered. How can a system function within its own complexity? How can a complex system still operate effectively and reproduce itself? What can systems do that researchers, with their definition of complexity, cannot observe? Should the conclusion be that systems know better about themselves than what the researchers can actually figure out about them?
6. *Systems are path-dependent, meaning they have a history and the history influences behaviour* – In this style of formulation, the statement cannot be contested. However, the statement also opens a universe of questions. How can that come about? From the history of a system, what is forgotten? And how does what is maintained acquire the capacity to affect the present behaviour of the system? Of the countless things that happen to and in a system, how does it separate what is relevant for the future from what should be left behind? Do systems have selective memory? If so, how does it operate?
7. *Systems have boundaries but their boundaries are impossible or very difficult to know with precision* – The theme of systems' boundaries is a recurrent one and also one that leads to considerable misunderstandings. What sort of boundaries do systems have? Physical? Logical? Semantic? What do the boundaries separate? A system's components from non-components? How can the non-components still relevant for the system be distinguished from those the system should not care about? What are the criteria and processes to separate them? Furthermore, how does the system maintain its boundaries and ensure they are effective?
8. *Systems are self-organizing – system dynamics arise spontaneously from internal structures* – This statement is also often used; however, little is explained about how this happens to be the case. If systems are indeed self-organizing, it is necessary to identify the "self" that organizes itself; where is it? Self-organization implies a number of capabilities and functionalities; the system should be able to make distinctions, observe, observe itself, choose selection criteria, make selections, decide about what to do with whatever

is selected, find a coherent fit with previous selections, and so on. The self has to have all these competences and much more. It also has to deal with what is outside the system, as for instance other systems in the spheres of politics, the law, education, science, and so on. How does such a "self" appear, and how does it consistently deal with all of that? Or is this self only a metaphor?

As this large number of questions shows, the tasks of health systems thinking and the use of the suggested tools are endeavours full of uncertainties. A message this book conveys about the health systems thinking approach and its dominance in health systems research is of its recognizable value, but also the need to move forward, adopting more consistent theoretical references.

Answers

The points below present tentative answers to the questions raised in the previous section. They briefly discuss each of the key features that proponents of health systems thinking have promoted. To make it easier for the reader to connect the answers to the respective questions, those questions are summarized at the start of each paragraph.

1. *Systems are resistant to change and systems are always changing* – How can researchers know to what extent they are dealing with resistance to change or with change itself? How can they distinguish whether they are looking at something that is changing or something that is resisting change, or even something that is doing both at the same time? And how about changes in the way the system resist changes? Can these still count as resistance or change? More than a play on words, the critical intention is to emphasize that without a comprehensive theoretical framework the researcher is likely to get lost. If, as Luhmann indicates, systems pursue their autopoiesis, then resistance and change can be interpreted from a clearer perspective. Change or resistance become meaningful in the context of the autopoiesis of the system; with these considerations, the analysis has a better sense of direction. Change happens when the system observes the potential advantages of answering the demands better, reflecting the pressures observed in the external as well as internal environment. In contrast, resistance to change would be a process of preserving the integrity

of the system as it is operating, avoiding the risk of depleting the system of its capacity to process and respond to the internal and perceived external pressures; the system would have the paramount orientation to preserve its capacity to observe, process and decide what to do next, whether retaining redundant elements or incorporating new ones. Nothing other than the autopoiesis of the system is at stake.

2. *Systems are governed by feedbacks loops* – when does a feedback loop have to be discontinued, modified, increased, replaced, etc.? A stubborn feedback loop will certainly lead to the collapse of the system. Something has to govern the feedback loops for the sake of reaching systems' functions; the pursuit of autopoiesis aims cannot itself be carried out by feedback loops. What is governing the loops then? Luhmann's conceptualization of recurring communications, which maintains but also changes and adjusts themes, codes, programmes and expectations (remaining open to additional meanings), is more suitable than the concept of feedback loops with its mechanical outlook. A self-organizing system can choose which loops to set in motion, interrupt or discontinue; in this way, instead of governing, the loops are governed upon.
3. *Systems are comprised of networks of nodes and ties, and networks take defining structures* – How is the behaviour of the network's nodes determined by the structure of the network when the network structure itself is brought about by the behaviour of its nodes and ties? If this is a recursive phenomenon, repeating itself again and again, behaviour–structure–behaviour–structure–behaviour–structure, and so on, what prevents the system from getting into a pattern that will never change and therefore will never incorporate any responses to changes in the environment? Will that unavoidably lead to the demise of the system? The way out of this conundrum seems to be in the self-referring and self-organizing capabilities of the systems. The Systems Theory indicates that the system can observe the operation of the internal and external networks. The self-observation allows the system to decide on the patterns of the network that may need to be changed. A network that cannot be observed and cannot be adjusted, whatever the observational capability, cannot belong to the system itself. Although the self-observation is carried out by elements of the internal network, the communications that such self-observations entail are not predicted or directed by the structure of the network. Communications construct and change networks, not the other way round (see additional discussion on Networks in Chapter 5 on health systems thinking tools).

4. *Systems are made up of tightly linked sub-systems and a change in one may affect the others* – Luhmann argues that complete interconnectedness and interdependence of all a system's elements is a highly improbable state. According to him, if that were the case, all disturbances would require the entire system to be rebalanced anew; taking time and consuming precious energy. He said that, while the system tries to rebalance, another disturbance may occur and the system could be severely burdened, never achieving a stable state. For that reason, it is necessary to consider that the commonly held view of the integration of the system does not correspond to reality. As an evolutionary characteristic of systems, they in fact developed internal specialized reactions and capabilities to isolate disturbances and solve them separately. The question should then be reformulated as how far a system integrates its parts and how vulnerable it might become in consequence of that. What is then better: a system with tight internal connectedness or degrees of looseness? Empirical studies aiming to answer such a question should give up on the old conceptions of tight interconnectedness of all a system's elements.
5. *Systems are counter-intuitive, have large numbers of elements interacting in non-linear fashion, and therefore have cause–effect relationships that may not be fully knowable* – That seems a reasonable understanding, that complexity may include known unknowns as well as unknown unknowns. However, how can a system function with its own complexity? Should the conclusion be that systems know better about themselves than what the researchers can actually figure out about them? If that argument puts the researchers in a humble (most likely realistic) position, it is still, on the other hand, necessary to have an explanatory model to give an account of the way the system deals with its own complexity and the elements unknown to the researchers. How can a system, with its complexity, still operate adequately and reproduce itself? What can systems do that researchers, with their definition of complexity, cannot work out? If the non-apprehensible reality of systems is a matter of fact, what are the implications for those studying and working inside them? Will they have to admit their limitations from the start? Will they have to accept that the system knows better? The notion that systems have self-organizing capabilities helps to put most of these questions in a better perspective, and perhaps answer some of them. Self-organization requires a number of related functions (point 8 expands this topic).

6. *Systems are path-dependent, meaning they have a history and the history influences the current behaviour* – The statement opens a universe of questions. How can that come about? From the history of a system, what is forgotten and how does what is maintained affect the present behaviour? Of the countless things happening to and in a system, how does it separate what is relevant for the future from what should be left behind? Do systems have selective memory? If so, how does it operate? These are all pertinent questions triggered by the statement. Two points from the Social Systems Theory help in addressing these questions. One is about the complexity reduction capabilities of the system. Systems face huge complexities in their environment but can only deal with a limited number of elements they can observe in the environment. This operation reduces complexities (of what the system observes).[2] Besides that, once external elements become information inside the system, the system also needs to keep the internal complexity-enhancing possibilities under control (to avoid the risk of self-destruction). In this way, a system constructs its history and maintains the memory of the internal and external advances it is constantly making. However, disappointments occur, and expectations about both the internal performance and the external observed elements are actualized in unpredictable ways. That forces the system to constantly find a balance between keeping redundant elements and trying innovation. In one or the other case, the system should make its choices for the sake of its autopoiesis.
7. *Systems have boundaries but their boundaries are impossible or very difficult to know with precision* – The theme of systems' boundaries is a recurrent one. What sort of boundaries does a system have? Physical? What do the boundaries separate? A system's components from its non-components? If yes, what are the criteria to separate them? In particular, how far can an internal network stretch itself and still include external nodes and ties that can be considered part of the system? Where are the lines identifying those to be considered outsiders, despite them having ties with inside nodes?

2 As Annemarie Mol says about numerical measurements for diagnosis of vascular problems, for instance, "walking distances without pain in the legs": "Once numbers are scribbled in the patient's file, they come to have an independent existence as 'indicators', and possible errors of translation are no longer retrievable. Nor is the tone of voice (confident, hesitant, pleading). Thus some complexities are left out" (Mol 2002, p. 221). The reduction of complexities thus achieved is fundamental for proceeding with the clinical exploration to reach a final diagnosis.

Furthermore, how does the system maintain its boundaries and ensure they are effective? This list of questions already indicates how tricky the boundary issue is and how difficult it is to tackle these points without a comprehensive model of what is inside and outside a system and how these limits can be drawn. The Social Systems Theory takes a radical perspective in that regard. Systems are made up of communications; therefore the boundaries are not physical. What differentiates one system from another is the set of communications a system recognizes as belonging to it, in contrast with the others that are observed as belonging to other systems or the environment. The legal system would not make a diagnosis of a patient because it does not communicate in those terms; in the same way a health system will never make a decision characterizing a certain occurrence as legal or illegal. Each system communicates within the frame of its own binary codes. Meanings and no other type of separation make boundaries. Organizations, as a type of social system, also draw their boundaries with meanings and communications – in this case, communications based on the decisions taken in the organizations (which are carried out by those indicated by the membership criteria; members and non-members know their status vis-à-vis the organizations by the communications they maintain within it). The second key point is operational closure. The system is communicatively closed but observationally open; this means a system can only communicate internally (with the exception of organizations; see Chapter 7), but can observe the environment and the other systems in it. The information used in communications has to be produced internally. The environment does not have information. Information is the internal elaboration of what the system has observed in its environment. The same way that no one can have their own thoughts running in someone else's mind. These two points, operational closure and the demarcation by meanings and communications, set the question about boundaries on a more promising ground.

8. *Systems are self-organizing – system dynamics arise spontaneously from internal structures* – This statement is often used; however, little is explained about how this happens to be the case (the *advanced topics* in the *Annex* has a section on *System's Self-Reference*, expanding this important topic of the theory). If systems are indeed self-organizing, it is necessary to find the "self" that organizes itself: where is it? Furthermore, self-organizing implies a number of capabilities and functionalities; for instance, the system should be able to draw distinctions, observe, observe itself, choose selection cri-

teria, make selections, decide about what to do with whatever is selected, insert the selection in a coherent fit with previous selections, and so on. The self has to have all these competences and much more. How does such a "self" come about? Social Systems Theory says that all is done communicatively. Communication is the basis for self-reference and ultimately the autopoiesis of a system. Through the recursive essential nature of communication, by which the parts involved in it can retroactively refer to what had been communicated and then subsequently move on to confirming (or not) the understanding of the messages received, communication and its memories can be the bases for systemic self-reflection and self-reference. Self-organizing, according to the theory, is carried out internally by a system's own communicative competences. The role of communication – with its inherent recursive nature – for the construction of any system cannot be overemphasized. Self-organization does not arise spontaneously or randomly, as casual arrangements of parts that eventually become functional. Indeed, no system should leave its self-organization to chance. Self-organization needs to be understood in the context of autopoiesis, as operations by which the system seeks to reproduce its operational communicative capabilities, according to what the system evaluates as essential for its survival and preservation of its identity. Identity is communicatively constructed. Self-organization is one of those concepts that can easily be thrown into a discussion about characteristics of systems but is quite tricky when comes to explaining its mechanisms, and even more so in observing how it comes about.

Summary

We try here to bring together the discussions from the two preceding sections, with inputs from previous chapters, and draw some conclusions. The reflection starts with the perception that, in Health Systems Thinking, *systems* appear as collections of possible attributes and functionalities, with many elements and relations not yet grasped in their totality and complexity.

In the face of the enormity of the scientific challenge to unpack and repack health systems in some coherent unit keeping systemic features together, the WHO's tentative initial steps consisted in promoting a framework to assist those assessing, organizing and managing health systems. In 2007, the WHO published the Six Pillars framework. According to that framework, the system

is supported by or is itself those Six Pillars. If anyone wanted to approach a health system as such, attention was to be given to all the pillars, which represented differentiated spaces of practices, expertise, inputs and outputs that one could find in any health system. The approach recommended a balance of attention and support to the pillars. None of them or their interactions should be neglected, the guide prescribed.

For all those schooled in organizational and managerial matters for the last 60 years or so, that was an obvious call. The organization of an enterprise has to comprehend sets of functions that individually have some independence concerning their own objectives, but at the same time are highly reliant on each other. The advice that the system cannot reach its expected results if the basic components are not taken into account could hardly come as a surprise. In one way or another, as for any type of business, the Six Pillars correspond to sets of basic components of any public or private health enterprise.[3]

Health systems thinking therefore appeared subsequently as an attempt to advance to the next level – the "state of the art", so to speak – which nevertheless so far has consisted of a collection of bits and pieces, like in a mosaic.

For HST, the underlying notion is that a system has a number of elements (nodes) linked to each other by ties (relations), which jointly make up a network. A network has a certain structure that explains and determines and is determined by the behaviour of the nodes and ties. Besides that, the system shows regularity in the way the links between the nodes follow sequential possibly stable patterns, the so-called processes. These processes are repeated and maintained in an expected consistent fashion. Some processes and links seem to gather in clusters with some peculiar circularity causation, where effects determine causes, causes determine effects and so on, in loops that keep running with presumed stability.

Besides these features, the system also has an apparent capability to change these internal dispositions; the term learning and adaptation is used to characterize the occurrence of changes. Ideas of multiple simultaneous causality, non-linearity, indeterminacy and unpredictability are also tentatively incorporated into the efforts of conceiving health systems. This implies

3 The Six Pillars framework conceives of health systems as comprised of: 1) medicines, vaccines and other technologies; 2) health information; 3) health service delivery; 4) health workforce; 5) leadership and governance; and 6) financing. If we remove the word health (and closely related words like vaccines and medicines) from the names of these items, the list can be applied to any kind of business.

that changes in a certain arrangement in the system can have consequences far beyond the immediately recognizable close connections; the effects could happen well into the future or into some other dispositions apparently independent from the changed ones, although belonging to the same system.

This is not the end. Health systems thinking is further enriched with additional features. It defends that systems also have boundaries, although the nature, location or constitution of those limits are not precisely established. These boundaries, whatever they are, nevertheless do not seem to lock or isolate the system inside itself. Boundaries are accepted as possibly porous and allow things in and out, permitting relationships between whatever is outside the system and something allegedly inside. How inside and outside remain where they are and do not get confused about their locations is not fully addressed.

This collection of elements and functionalities is still supposed to be kept together in some operationally consistent manner by a self-organizing capability. Systems are supposed to know how to organize themselves. The health system is expected to be doing this, and be improving its adaptation and development as a result of that. Whether self-organizing capabilities are spontaneous, automatic processing competences, an inevitable outcome of the natural interlocking of the components of the system interacting with each other, or have all of those as well as other origins, is not clear. Self-organization is kept as a matter of "belief", or perhaps the attribution of managers of the system, whoever they might be, with a tacit understanding that as long as the researchers keep looking, something will appear more clearly out of this mosaic-like collection of elements.

Social System Theory brings to the debate a set of concepts that can put the pieces of the health system together in a more comprehensive and consistent way. Health systems pursue their autopoiesis; they do that by reproducing the communications they have the prerogative to make; they have boundaries established by the specific meanings they use; they can observe themselves, other systems and the environment; by doing so and communicating internally they show self-reference and self-organizing competences; by performing self-observation and self-organization, the system can manage its own complexity by the selection capabilities of communications themselves.

The next chapter continues the debate with critical reflections on tools currently used under the banner of "Health Systems Thinking", as described in the book *Applied Systems Thinking for Health Systems Research, a Methodological Handbook*, edited by D. de Savigny, K. Blanchet and T. Adam (2017).