Part I
Complexity and Health:
Challenging the Orthodoxy

The world we see that seems so insane is the result of a belief system that is not working. To perceive the world, we must be willing to change our belief system, let the past slip away, expand our sense of now, and dissolve the fear in our minds.

William James (1842–1910)
American philosopher, psychologist and physician

Complexity and Health

Complex adaptive system sciences have transformed most science fields with the exception of medicine and health services. It is freely acknowledged that an initiation into complex adaptive systems thinking can at first appear abstract, highly conceptual and even "un-usable". Unsurprisingly tensions arise when applying complex systems thinking in the "real world" of clinical care, healthcare organisations, or health system design.

In some literature, complexity theory and complex adaptive systems frameworks use highly specific language to explain the functioning of systems as a whole. It explicitly opposes reductionism—the assumption that breaking down a system into its parts is useful to explain and improve its functioning as a whole—and speaks to the *core driver* of a system that "*determines*" its long-term direction. In other literature, "systems thinking" or "complexity approaches" are used in quite specific application, such as mapping relationships, identifying feedback loops, finding gaps in knowledge, or explaining particular successes/failures. While the underlying principles are common in both bodies of literature, it is apparent that the conceptual and the applied can sometimes appear to not speak to each other, or even conflict. Whether the interest is the *core driver* of a system or a system's long-term direction or being able to address a specific problem with a systems view, it is necessary to have a solid grounding in both theoretical and applied approaches.

Understanding complex systems and their behaviour has to become a required skill to solve the many problems facing health systems. As the Institute of Medicine pointed out:

> *Health care is complex because of the great number of interconnections within and among small care systems . . . Health care systems are adaptive because unlike mechanical systems they are composed of individuals - patients and clinicians who have the capacity to learn and change as a result of experience. Their actions in delivering health care are not always predictable, and tend to change both their local and larger environment* (Institute of Medicine, 2001: 63–64).

Key points to navigate enablers and barriers to system change include:

- Complex adaptive systems theory can help identify the big picture, common drivers of our health system, where and when they limit the ability to change and where leadership and advocacy may be targeted
- Systems thinking can help us understand problems and identify potential solutions to these problems that are not obvious—because they lie in the connections of the system, rather than in specific parts of the system
- Adopting complex systems approaches can bring to light how events, or change, in one part of the system affects other parts of the system
- While complex adaptive system thinking cannot provide "easy answers" [1] it provides a fertile ground to think about and evaluate many different possible solution in context which avoids the "common unintended mishaps" resulting from enforcing linear "expert solutions"

This section aims to provide readers with the necessary philosophical and technical background to systems sciences, the nature of health, and health system organisation and their dynamics. The chapters explore:

- The nature of systems sciences
- The visualisation of complex systems based on Capra's vortex metaphor [2]
- An understanding of the co-existence of different degrees of complexity and their dynamics within complex adaptive organisations based on Kurtz and Snowden's Cynefin model [3]
- The nature of health as a "complex adaptive experiential state"

References

1. Heifetz R (1994) Leadership without easy answers. Harvard University Press, Cambridge, MA
2. Capra F (1996) The web of life. Harper Collins Publishers, London
3. Kurtz CF, Snowden DJ (2003) The new dynamics of strategy: sense-making in a complex and complicated world. IBM Syst J 42(3):462–483