and reductionistic orientation first began to be undermined by the revelations of quantum physics (Capra, 1975). Since then, the emergence of the new science has reflected growing recognition that a system can only be fully understood as a whole, since the essence of the whole does not reside in its parts but in the nature of their interconnectedness. As a result, any part of a system can only be fully understood in terms of its relationships with the other parts of the whole system (Freeman, 1978).

From this perspective, it is also necessary to recognise that any given entity – a molecule, a cell, an organ, a person, a team, a department, an organisation – is simultaneously both a part and a whole. It is a system unto itself, comprised of parts that are both distinct and interconnected; yet it is also an interdependent part of an even larger system. This system-within-a-system feature constitutes the "holarchical" nature of the known universe (Harman, 1998; Wilber, 1996). Higher-level systems are more complex than lower level systems (i.e., the "parts" of the higher system), in that those higher systems "transcend and include" lower systems. In other words, all the properties of the lower system are included in the higher system, yet the higher system also demonstrates transcendent properties that arise from the relationships among its parts. These systemic properties are not found in the parts themselves, but are derived directly and solely from the complex interactions among the parts.

Self-organising

Second, living systems are self-organising (cf. Jantsch, 1980), in the sense that the guidelines for healthy functioning are intrinsic to each system. An example of this encoding is found in the genetic material that determines the specific features and qualities of a living being. This genetic programming naturally gives rise to a pattern of differentiation and integration within and among the various parts of a system that enable it to carry out its life-sustaining functions, adapt to changes in environmental conditions, and even heal itself when the system becomes sick or is harmed. As complex living system grow to maturity, their constituent parts display a tendency to diversify, differentiating from each other in order to carry out particular functions that contribute to the overall well-being and complexity of the larger system. Consider, for example, the amount of differentiation and functional specialisation necessary for a human zygote to become a living, breathing baby. Conversely, a significant reduction in the diversity of species comprising an ecosystem can threaten the survival of the entire system (Callenbach, 1998).

Furthermore, the distinct and diverse parts of a thriving living system engage in patterns of interaction that serve to maintain

the homeostasis of the system, a dynamic equilibrium in which there is constant change and adaptation in the context of holding a steady state within a certain band of parameters (Boulding, 1953). In this way, living systems are self-regulating, as reflected in the human body's ability to maintain a relatively constant temperature, an ecosystem's ability to survive for hundreds or thousands of years, and the Earth's ability to maintain the particular atmospheric conditions needed to support life on the planet (Lovelock, 1988). Since living systems contain the "information" required to make adaptive changes and maintain their own health and well being, they can also be thought of as self-managing. This suggests that the intelligence needed to develop and maintain itself is contained within the system, reflecting the cognitive capacity inherent in living systems (Capra, 1996).

Co-evolutionary

Third, living systems are co-evolutionary, which refers to the fact that systems evolve along with their environments in a mutually reinforcing pattern of influence. The various parts of a living system engage in continuous input-transformation-output cycles, with the output of each part of a system serving as the productive input of one or more other parts. In healthy living systems, then, output that could be viewed as "waste" from the perspective of one part actually constitutes useful input to a different part, thereby contributing to the maintenance of the larger system. Since every system is itself part of a more complex, higher-level whole, the "environment" of any given system is thus recognised as nothing other than the larger system in which it is embedded. Just as each part must adapt and respond to changes in its environment (i.e., the outputs of the many other parts of the system, which serve as its inputs), the systemic environment also adapts and responds to the changes in its parts. Since the cumulative, interactive pattern of adaptations shapes the evolutionary paths of these systems, it is clear that parts and wholes essentially co-evolve together in a continuous, reciprocal chain of influence.

Viewed in these terms, it is clear that healthy systems are those in which the parts interact in ways that contribute to, rather than detract from, the well being of the system as a whole. As a counter-example, cancer cells are parts of a human being that act in ways that impede the effective functioning of other parts of the system, thus dramatically reducing the overall health of the whole person. Similarly, unhealthy competition, selfish agendas, and political maneuvering can all serve to undermine the functioning of a social system. In ecosystems, on the other hand, the inevitable competition within and among species along the food chain can be better understood as reflecting a natural and necessary part of the self-regulating cycle of the ecosystem as a living being. From the perspective of the ecosystem, the presumed competitors are merely carrying out their functional role in a sophisticated input-transformation-output cycle of interaction