Editorial

Thow Yick Liang

Singapore Management University,
Lee Kong Chian School of Business,
50 Stamford Road, 178899, Singapore
E-mail: tyliang@smu.edu.sg

Biographical notes: Thow Yick Liang holds two first degrees in Mathematics and Physics, MSc in Remote Sensing/Computer Image Processing and PhD in Particle Physics. Currently, he is teaching a course on intelligent organisations (Complexity-Intelligence Strategy) at the Singapore Management University. He is the Editor-in-Chief of the *International Journal of Complexity in Leadership and Management*. He is also a member on the Editorial Board of *Human Systems Management* and the *International Journal of Quality and Innovation*. He has over 70 publications. He has also published a book entitled *Organizing Around Intelligence: The New Paradigm*, 2009, 2nd ed., World Scientific Publishing.

John Holland a renowned pioneer researcher in complexity visited the Nanyang Technological University on the first half of April this year. I attended his short course on 'steering complex adaptive systems: signals, boundaries and niches' on 8, 11 and 13 April. Currently, he is a Professor of Psychology and Professor of Electrical Engineering and Computer Science at the University of Michigan. I am greatly amazed by his alertness, unique personal insights, and intellectual prowess.

Holland was born in 1929 in Indiana. So, he is now 82 years old. But there is no sign of significant aging. Apparently, he has *adapted* very well, nurtured highly positive *hidden order* by exploiting *chaos to order* – I have borrowed three terms from his three books, namely, as follows:

- 1975, 1992, *Adaptation in Natural and Artificial Systems*
- 1995, *Hidden Order: How Adaptation Builds Complexity*
- 1998, *Emergence: From Chaos to Order*.

Holland is the first recipient of a PhD in Computer Science (1959) and he is the father of genetic algorithms. He saw a link between biology and computation, and worked on artificial networks of metaphorical neurons. He also formulated classifier systems and the Echo model as tools for studying the dynamics of complex adaptive systems (CAS). In 1961, he was awarded the Louis E. Levy Medal by the Franklin Institute. He is also a recipient of the MacArthur Fellowship (1992). He is a fellow of the World Economic Forum and a member of the Advisory Board on Complexity at the McDonnell Foundation. At the moment, he is still an external professor and a member of the Board of Trustees and Science Board of the Santa Fe Institute. Vividly, he is still highly active academically despite his age.

According to Holland, many of today's most difficult world problems centre on CAS. For instance, "biological cells have a complex hierarchy of semi-permeable membranes

Copyright © 2011 Inderscience Enterprises Ltd.

with proteins acting as signals that selectively pass through these boundaries to activate different parts of the cell's metabolic network. It is very difficult to steer cells (such as antibodies in the immune system) because 'invaders' (such as antigens, e.g. flu viruses), continually adapt". He added that "further examples are ecosystems (niches), the central nervous system (cell assemblies), governments (bureaus), firms (departments), and production lines (stages). Control depends upon a clear understanding of the complex signal/boundary interactions present in these and all other CAS. Because there are common features in these interactions, a unified treatment is a definite possibility".

Fundamentally, complexity is a rather new domain. In particular, the study and analysis of the human world and its microcosms as CAS is even more recent. In human organisations/systems very often five perspectives namely, social, economic, political, education and environmental are highly interdependent. In such systems, the interacting agents are human beings each carrying a sophisticated intelligence source. The latter itself is a CAS that renders the interactive dynamic of human beings highly complex. However, I believe through ceaseless reflective observations, analyses and researches more profound insights will definitely emerge.

In the domain of computer science, Holland's contribution in 'evolutionary computation' has elevated him to the same status as some early computer scientists such as Alan Turing, John von Neumann and Norbert Weiner. In particular, his new panacea to the creation of artificial intelligence is highly important. Many computational problems require a computer programme that is adaptive. Such a programme encoded with a set of simple rules 'learn by itself' and consequently complex behaviour emerges. This 'bottom-up' paradigm provides a method for searching a large set of possibilities for a best possible solution.

In this respect, an artificial intelligence source/node is created. Such a source possesses 'computational artificial intelligence'. An appropriate set of these artificially created intelligence nodes will be highly beneficial to a network of natural nodes (human thinking systems). Any human organisations that are supported by a well-integrated network of natural and artificial nodes are in a better position to manifest higher collective intelligence. In the current context, a higher collective intelligence is a vital driving force and it is closely associated with more effective intelligence-centric organisational structure, and the new management and leadership strategy.