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# RSIS COMMENTARIES

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## **Complexity Science and Public Policy: Whither the Policy Maker?**

By Adrian W. J. Kuah

### **Synopsis**

*Policy makers the world over are drawing increasingly on complexity science to help them make sense of a whole range of economic, social, political and security issues. However, complexity science has far-reaching implications for how policy makers understand the world.*

### **Commentary**

In his speech at the Yale-NUS College groundbreaking ceremony on 6th July 2012, Prime Minister Lee Hsien Loong stressed the importance of an “appreciation of complexity” by graduates of the college. This cryptic remark underscores the fact that complexity science is now the rage in government and public policy.

The realisation that social, political and economic systems – that is to say, human systems – are best understood as complex systems that are dynamic, adaptable, emergent, self-organised and non-linear, has resulted in new tools and techniques available to policy makers. For example, in 2010 Danish forces operating in Helmand, Afghanistan experimented successfully with self-synchronised social networks to manage their operations and intelligence activities, in contrast to the more traditional hierarchical, top-down command structures used in battlespace management.

Globally, city planners are adopting techniques used in the analysis of complex fluid flows in the hopes of better understanding, anticipating and managing traffic flows. Agent-based models based on complexity science have augmented conventional epidemiologic models that (wrongly) assume that the probability of infection is normally distributed in populations that are homogenous. And in the national security enterprise, network-analysis methods are being used to identify associations of terrorists and to map the networks of terrorist cells.

Given that government officials are increasingly encountering a daunting class of problems that involve complex systems, the emergence of complexity science has been timely and fortuitous. However, the full benefits of complexity science cannot be reaped unless there are accompanying shifts in the mindsets and expectations of policy makers.

### **From Clockwork to Network**

Given that all complex systems have features in common, the main attraction of complexity science to policy makers is that the full suite of policy tools derived from complexity science can be universally applied to a wide

range of policy problems spanning pandemics, traffic jams, terrorism and so on. While the versatility and effectiveness of complexity approaches remain to be seen, there is no denying the growing prevalence of complexity thinking in public policy. However, complexity science is based on a particular worldview that is at odds with how policy makers typically view the world.

The worldview of the policy maker is that of the Newtonian World-Machine, to use Fritjof Capra's term. The world is seen as a machine comprising basic parts interacting in predictable albeit complicated ways, where the machine is driven by the twin imperatives of rationality and efficiency. Furthermore, an understanding of how the machine worked can be gleaned from an understanding of how the individual components worked. Finally, the machine tended towards equilibrium, and any deviation from equilibrium could be rectified by the turning of a dial or the pushing of a lever. In such a worldview, the policy maker's role is to turn the dials and push the levers of the machine.

The worldview that underpins complexity science and complex systems could not be more different: the universe is no longer seen as a (more or less) stable and predictable machine, the understanding of which can be derived from the study of its parts. Instead, it is an integrated and indivisible whole, a complex system of dynamic relationships that also enmesh the policy maker, and where micro-changes in its environment can be amplified in the system's output. Furthermore, it is a system that is dynamic and may not settle on an equilibrium state, if even such a state exists.

The unresolved contradiction arising from holding a mechanistic, deterministic worldview while applying complexity-based policy tools will result in a superficial, problematic and ultimately failed adoption of complexity thinking in public policy.

### **Whither the Policy Maker?**

Clearly, complexity science has provided new processes for tackling problems. However, the recommendations made by complexity researchers to policy makers can best be described as unpalatable, to say the least. For example, given that complex systems are adaptable and self-organising, it may be that sometimes the best thing for policy makers to do is to do nothing; rather, they should sit back and let the system "sort itself out". This runs counter to the abiding image of the policy maker as a heroic figure whose task it is to take aggressive action to solve economic problems or society's woes. Not only do policy makers have an in-built 'action bias', the people they serve also expect them to 'do something, anything' in a crisis. And yet a major implication of complexity science can best be summed up in the line from Winnie the Pooh: don't underestimate the value of doing nothing.

There is also the problem of attribution and evaluating how policy makers perform. In complex systems, where small changes can have big effects, big changes small effects, and where effects have unanticipated causes, it is difficult to disentangle what the policy maker does from the system's inherent dynamics. This characteristic of complex systems can result in policy makers claiming undeserved credit on the one hand, as well as being wrongfully blamed on the other.

Finally, complexity science necessitates a shift in mindset away from the deterministic to the probabilistic. Complexity science focuses on identifying and analysing trends and probabilities, rather than predicting specific events. Applied to public policy, this essentially changes the name of the policy game from algorithms to heuristics.

With regards to complex systems, the emphasis must therefore shift from doing something to control the system, to shifting the system's parameters in order to influence how the system unfolds. If policy makers wish to operate effectively under conditions of complexity, then it is necessary for them to move beyond determinism and to abandon the reassuring myth of control. The continued uncritical application of policy tools based on complexity science, absent an appreciation of its underlying assumptions, will likely result in unrealised opportunities at best, and the misapplication of tools at worst.

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