

IPS-Nathan Lectures

**The Challenges of Governance
in a Complex World**

**Lecture I: Hunting Black Swans & Taming Black
Elephants: Governance in a Complex World**

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**2016/17 S R Nathan Fellow for the Study of
Singapore**

5 April 2017

NUSS Kent Ridge Guild Hall

Introduction

Before we begin, I would like to say a few words on the late Mr S R Nathan, for whom this Fellowship is named.

Mr Nathan had a long – and storied – career in public service. He started out as a social worker. He played an instrumental role in the founding of the National Trades Union Congress, and helped to lay the foundations of the Ministry of Foreign Affairs. As Director of the Security and Intelligence Division, Mr Nathan put his life on the line, without hesitation, during the 1974 Laju Ferry Hijack. And of course, eventually, he became Singapore’s longest serving President, a position which he held with grace and distinction, epitomising the ideals of public service.

Mr Nathan inspired and trained generations of public servants like me in the craft of government. He brought to his work a broad-minded and earthy understanding of human nature and society. He avoided easy answers to the challenges of governance.

In the book, “S R Nathan in Conversation”, Mr Nathan was quoted as saying,

“Policy decisions are complex – the straightforward ‘yes’ or ‘no’ answers often demanded by the critics are rarely possible. There are often grey areas, compromises – there is never an ideal solution to anything. You can very rarely have changes without some kind of sacrifice.”

This observation naturally brings me to the topic of this evening’s lecture – “Hunting Black Swans and Taming Black Elephants: Governance in a Complex World”.

This is the first of four lectures – and they are all connected– so this is therefore a bit of a scene-setter. But all these lectures are linked, and I shall use the framework of *complexity* to explain some emerging concepts of governance in each of the four lectures.

In addition, I shall use the approach of “circling and deepening”, a description that has been applied to the late Nobel Laureate Derek Walcott’s work. I shall revisit themes and examples in every lecture – circling and deepening – around them in order to generate new insights and fresh learning points.

But it is in this first lecture that I shall dive more deeply into complexity in order to explain what it is, and why it is so relevant to governments and to good governance in today's unpredictable and uncertain world. I shall also explain why the nature of governance is changing in response to complexity, and how governments can adapt to these changes.

Complexity

Stephen Hawking, the world-famous theoretical physicist, said, "I think the next century (the 21st century) will be the century of complexity."

But what is *complexity*? And what is its relevance to governance?

Complex is different from *complicated*. An engineering system is merely *complicated*. It could be an A380 or a telecommunications satellite. Its inner workings may be very difficult for a layman, who is more likely than not to describe it as *complex*, when it is actually just *complicated*. Complicated systems have Newtonian characteristics in that they perform pre-determined functions that are predictable and repeatable, in which input leads to a predictable outcome.

In contrast, a *complex* system will not necessarily behave in a repeatable and pre-determined manner. This is because a system that is complex contains a large number of autonomous parts – agents – connected to one another, and interacting in a great many ways. They often generate their own feedback loops.

To understand the behaviour of a complex system, we must understand not only the behaviour of each of these agents but also how they interact with one another, and then how they act together as a whole. But with the current state of science, this is an almost insurmountable challenge.

Cities – like Singapore – are undoubtedly complex systems. They are made up of hundreds of thousands, even millions, of people – who are the *agents* in the parlance of complexity. Each person interacts with others, producing outcomes that often confound and astonish planners and policy-makers. Jane Jacobs, an American scholar of urban systems, aptly described the

complexity of cities in her highly influential book “The Death and Life of Great American Cities”. She wrote,

“City processes in real life are too complex to be routine, too particularized for application as abstractions. They are always made up of interactions among unique combinations of particulars, and there is no substitute for knowing the particulars.”

All human systems are complex, not just cities. Countries are complex, as are political systems. The world as a whole is complex.

There are many definitions of complexity, but all of them agree that complex systems are characterised by the property of *emergence*. The connections and interactions among the many agents in a complex system lead to outcomes that are inherently unpredictable *ex ante*, and that are only revealed when they actually occur. So, when something happens, we are surprised.

Black Swans

Nicholas Nassim Taleb famously described one class of such surprises – rare and hard-to-predict events – as *black swans*.

In Taleb’s view, black swans are not just surprising, but also have another important characteristic: their impact is large and game-changing.

In 2002, not long after 9/11, Donald Rumsfeld who was then US Secretary of Defense, introduced us to a close relative of the black swan, the *unknown unknown*. He said,

“There are *known knowns*. These are things we know we know. We also know there are *known unknowns*. That is to say we know that there are some things we do not know. But there are also *unknown unknowns*, the ones we don’t know we don’t know.”

Now, you may laugh, but if you are in the business of government, or if you have at least a passing interest in our future, then you ought to understand what *known unknowns* are, and

what *unknown unknowns* are, because you are going to be surprised by both every now and then. And it helps to understand the difference between them.

Strategic Surprise

When I was a young officer in MINDEF in the early 1980s, I think I would have found it very difficult, if not impossible, to grasp the concept of transnational terrorism that today preoccupies governments around the world, because the conditions that produced Al Qaeda and the Islamic State did not exist in those days. And in those days, cyber warfare was a concept that we could only dimly understand, because the underlying technology was only just emerging. Today, such things have become part of mainstream thinking.

Indeed, one of the foremost challenges facing any government is the challenge of strategic surprise.

Singapore has experienced many of our own strategic surprises in our short life as an independent state. The Asian financial crisis of 1997/1998 was one, as was the uncovering of the Jemaah Islamiyah (JI) terrorist network in December 2001. The Severe Acute Respiratory Syndrome (SARS), which hit Singapore in February 2003, precipitated a national crisis, leaving more than 30 people dead, and caused a recession that year. Then in 2008/2009, the shocking and unexpected collapse of Lehman Brothers led to the global economic and financial crisis. Since then, there has been a succession of shocks, including the drastic plunge in oil prices that began in 2014, the reverberations of which are still being felt today, Brexit, and most recently, the US Presidential Election.

The Butterfly Effect

The complexity of our world owes a lot to its highly-interconnected nature. The world has been transformed by huge leaps forward in technology in the last half century, especially in telecommunications and more recently the Internet. These, combined with innovations in transportation such as the container and commercial jet aircraft, have catalysed globalisation and led to vastly increased trade as well as the movement of people around the world. The resulting increase in density of connections and feedback loops has in turn greatly increased complexity at the global level.

In this highly-interconnected world, what happens in one part is going to affect other parts – the so-called *butterfly effect* which postulates that the flap of a butterfly's wings in Brazil can set off a tornado in Texas. This was the title of a lecture by Dr Edward Lorenz. The butterfly effect is the concept that small changes in initial conditions can produce large effects in a complex system. Not surprisingly, it was in weather forecasting that scientists gained a lot of insights into this phenomenon. More generally, events and actions in different parts of a highly-interconnected system interact with each other in complex, non-linear ways, to produce effects that are difficult to determine *ex ante*. Instead, to use the term I introduced earlier, their behaviour is *emergent*. To reiterate, this is the defining characteristic of the complex world that we live in today.

The Tohoku Earthquake

A vivid example of the butterfly effect is the Tohoku earthquake that occurred six years ago. Japan is one of the most seismically active regions in the world. So why was the calamity that befell Japan on 11th March 2011 such a big surprise? Was it because of the scale of the disaster? Indeed, the Tohoku earthquake and tsunami was a huge catastrophe for Japan. It killed around 18,000 people and resulted in direct material damages estimated by some at well over US\$250 billion for Japan, making it the most expensive natural disaster in history.

But an equally important reason is the butterfly effect – the chain of events, beginning with the earthquake, which triggered a large tsunami, which then damaged the Fukushima nuclear power plant, causing a meltdown and radiation leakage. Arguably, it was the meltdown that was the *black swan*. Its impact was felt far beyond Japan, like the hypothetical tornado in Texas. It brought the safety of civilian nuclear power into question, not just in Japan, but around the world, and led one major economy half a world away from Fukushima – Germany – to forswear its use.

The Fukushima nuclear disaster was the result of complex interconnections and interdependencies, combined in this case with significant human failures including outright negligence and what Margaret Heffernan called “wilful blindness” in her book of that title. The reality is that it is extremely difficult to estimate the cumulative effects of such complex events. It makes preparing for unforeseen situations an exercise fraught with difficulty. It also adds to the challenges of governments operating in complex situations.

The Arab Spring

In December 2010, Mohamed Bouazizi, a street vendor in Tunis set himself alight. He was upset that he was not heard by the authorities, that he was being harassed. It was a *terminal* protest, because he died from the self-immolation. But that single act – a single event – triggered the *Arab Spring*. The consequences were dramatic. Governments collapsed in Tunisia, Egypt, Libya and Yemen. Governments changed in Kuwait, Bahrain and Oman. A civil war broke out in Syria, and it is still raging more than six years after Bouazizi killed himself. It can be argued that these events set the stage for the rise of the Islamic State.

The most imaginative novelist could not have written the script for the Arab Spring. It would have taken the bravest analyst a huge leap of imagination to predict the Arab Spring, such as it was. Truth, as it is often said, is stranger than fiction.

The famous British historian and politician, H A L Fisher, concluded in 1935, not without a touch of irony, that,

“Men wiser and more learned than I have discerned in history a plot, a rhythm, a predetermined pattern. These harmonies are *concealed* from me. I can see only one emergency following another ... and only one safe rule for the historian: that he should recognise in the development of human destinies the play of the contingent and the unforeseen.”

In other words, we shall continue to be surprised.

Hindsight

The Arab Spring has spawned a growth industry. There are now countless political and social scientists, historians and Arabists all trying to explain the causes of the Arab Spring. Many will find convincing reasons as to why these events unfolded as they did.

But all this will be in retrospect. It is in the very nature of such post-mortem analyses that thinking and explanation must be fundamentally backward-looking. That explanations *after the*

fact are the norm for strategic surprises like the Arab Spring and the Fukushima nuclear disaster underlines the lack of any simple patterns in the complex world that we live in.

The 19th century Danish philosopher, Søren Kierkegaard, observed that “life is understood backwards, but must be lived forwards.” You can look backwards in time to understand why something happened. That is hindsight. But hindsight does not necessarily translate into foresight. Simply because we can provide an explanation for why the current state of affairs has arisen does not mean that we are in a position to forecast the next drama or political catastrophe. Instead, these outcomes seem to be lurking somewhere, hidden from view, just over the horizon or around the corner, to surprise us when we least expect it. That is the problem. We cannot predict the future.

Undoubtedly, there are fascinating “what if” questions arising from the drama of the Arab Spring. What if Mohamed Bouazizi had not set himself on fire? Or what if he had survived the self-immolation? Would there have been an Arab Spring?

The fact of the matter is that we cannot really answer such *what if* questions. The propensity to agonise over and analyse surprising and shocking events such as the Arab Spring satisfies the emotional need for answers to questions like *what if* and *why*. But such illumination will not necessarily help us to anticipate or avoid the next strategic shock. The future is neither inevitable nor immutable. Applying the lessons of history is not enough to guide us down the right path into the future. Indeed, it is doubtful whether a single right path even exists.

Singapore’s founding Prime Minister, the late Mr Lee Kuan Yew, said,

“The past was not pre-ordained, nor is the future. There are as many unexpected problems ahead as there were in the past.”

It sounds like a truism, but it is the reality that governments have to deal with.

Complexity and Governments

The complexity of the world is something that governments should not ignore. The rise of complexity will generate more uncertainty, and increase the frequency of black swans and other strategic surprises. In other words, complexity can cause big headaches for governments.

On the other hand, governments that make the effort to understand complexity, and then to learn to manage complexity, will gain a big competitive advantage. While they cannot avoid black swans altogether, they will be in a better position to subdue the impact of strategic surprise and reduce uncertainty. They will also be better placed to exploit opportunities ahead of the rest.

Professor Kees van der Heijden, the pioneer Dutch scenario planner, said,

“There are winners because there is uncertainty. Without uncertainty, there can be no winners. Instead of seeing uncertainty as a problem, we should start viewing it as the basic source of our future success.”

In fact, it was Charles Darwin who first recognised that uncertainty is a necessary pre-condition for change and adaptation to occur. And it is complexity that produces the uncertainty essential for innovation and serendipity.

In this regard, economists like Ricardo Hausmann and César Hidalgo argue that the most important predictor of growth is economic complexity, or the diversity of products that an economy possesses. So, complexity has an upside as well, and I will touch on this in more detail in my third lecture.

Yet, governments often ignore the complexity of their operating environment. They typically deal with complexity as if it is amenable to simple and deterministic, even linear, policy prescriptions. In a sense, the crux of public policy has been to apply – if not impose – orderly solutions to the myriad of complex problems that afflict our societies, our politics and our lived everyday experiences, in largely vain attempts to make what is complex merely complicated. We see this in legal systems that are based on uniform punishments to complex and varied

crimes, in public health enterprises that treat patients as largely homogenous, and education systems and pedagogies that assume that all children develop uniformly, or ought to.

Human Nature

This phenomenon points to an additional layer to the challenge of complexity, and that is our own human nature.

All human beings – including the great and the good – are afflicted with cognitive biases or more simply, blind spots.

Many disruptions – natural disasters, pandemics, even financial crises and political upheavals – do not fall into the category of black swans. Instead more often than not, they are either *known knowns*, or *known unknowns*. Once upon a time, all disasters – storms, floods, earthquakes, volcanic eruptions – arrived without warning. Today, modern science helps to forecast such cataclysms with increasing accuracy. Many of such disruptions can now even be assigned probabilities. This ought to lead governments to take precautionary measures. But often, they do not.

In his bestseller “Collapse”, the scientist and polymath, Jared Diamond, alludes to the inability to read trends or to see behind the phenomenon of *creeping normality*. Things get just a little bit worse each year than the year before, but not bad enough for anyone to notice. It is like the proverbial frog in boiling water.

Indeed, people often have a hard time properly ascertaining the present value of events that will take place in the future. This tendency to discount the future – to place less emphasis on future risks and contingencies, and instead to place more weight on present costs and benefits – is a common cognitive bias known as *hyperbolic discounting*.

Governments are particularly susceptible to the cognitive bias of hyperbolic discounting. The institutional position that political leaders occupy discourages them from spending time worrying about a problem that will – hopefully – disappear, or only occur after they leave office.

This begs the question of how viable a public policy enterprise is, if the boundary condition is the term of a particular government at worst, or the lifetime of the already-born citizen at best?

Related to this is the question of responsibility and trade-offs. For example, it can be argued that the current generation has a responsibility of stewardship of the future. However, in order to fulfil that duty, certain tough decisions have to be made and taken in the here and now. How much appetite is there really for such long-term thinking, in this society, or in any society?

At the risk of generalisation, many governments tend to focus on immediate problems and priorities related to the election cycle. They would rather defer expenditure on something that may or may not happen.

This is why, despite understanding the threat posed to future generations by global warming, many governments discount those effects and instead place greater emphasis on the current costs of mitigation and adaptation – leading to really suboptimal policies – if one takes the long view.

The Black Elephant

This leads me to another member of my menagerie, the *black elephant*. What is the black elephant? The black elephant is the evil spawn of our cognitive biases. It is a cross between a *black swan* and the proverbial *elephant in the room*. The black elephant is a problem that is actually visible to everyone, but no one wants to deal with it, and so they pretend it is not there. When it blows up as a problem, we all feign surprise and shock, behaving as if it were a black swan.

Last year, many of us would have been astonished to learn that the Treasury in the United Kingdom had made no contingency plans for *Brexit*, despite the fact that the polls showed that the outcome of the referendum would be a close call. The British military – which I presume is like most armed forces and makes contingency plans at the drop of the hat – also reportedly did nothing. The UK government looked decidedly flat-footed the day after the referendum. Surely this is an example of a black elephant? In fact, the only institution that had a Plan B was the Bank of England. My surmise is that because the Governor is not British – Mark Carney is

Canadian-Irish – he had no emotional skin in the game, and could take an objective, dispassionate, look at the situation.

In 2013, a small Ebola outbreak in Guinea ballooned within a year into an international health emergency in August 2014. Over 10,000 people died, and the economic cost to the affected nations in West Africa is estimated in the billions of dollars. But it could have been nipped in the bud if appropriate actions had been taken at the start.

These examples illustrate the tendency of the human mind to underestimate or ignore both sudden crises, as well as slow burn issues. Often through hesitation, and until events reach crisis proportions, no one takes any action.

Unfortunately, the black elephant is not an endangered species in the wild jungles of government. At best, we can try to *cull* them, but they are a resilient lot because of our collective cognitive failures.

Governance in Complexity

So, what can governments do to improve the way they manage complexity, and at the same time mitigate the effects of the various cognitive biases that afflict them?

One of the pioneer members of the Singapore Cabinet, Mr S Rajaratnam, was a very forward-looking person with a strategic outlook. Way back in 1979, he said,

“There are practical men who maintain that such speculations [thinking about the future] are a waste of time. And they have no bearing at all on solutions to immediate day-to-day problems. This may have been so in earlier periods of history when changes were few and minute, and were spread over decades and centuries. But because we are not only living in a world of accelerating changes but also of changes which are global in scope and which permeate almost all aspects of human activity ... And since change is about the future, then only a future-oriented society can cope with the problems of the 21st century.”

Mr Rajaratnam was talking about the operating environment of a globalised and complex world, in which the pace of change is accelerating. How do we cope with that? We must learn to think systematically about a future that is inherently Volatile, Uncertain, Complex and Ambiguous (VUCA).

But herein lies the conundrum that all governments face. How do you make plans and policies for the long term, knowing that changes in the operating environment are likely to occur within a shorter time frame, and that they will inevitably impact or even negate these plans? When you launch any big capital or infrastructure programme, you make certain assumptions. But inevitably, there will be changes in technology, and disruptions to the strategic environment. How do you factor in these changes, many of which cannot be foreseen, into plans and policies that we would like to last for 10, 20 years, maybe even much longer?

Foresight or Futures Thinking

We can start by accepting that complexity creates uncertainty. Prediction is not possible. Indeed, if it was, many of us would be out of jobs. Instead, as Mr Rajaratnam argued, the right approach is an orientation towards thinking about the future in a systematic way.

Clearly, changes need to be made to the way governments organise themselves. Their toolbox must be enlarged. We can adopt methods and processes that help us to reduce the frequency of strategic surprise, and when the inevitable shock occurs, to reduce the amplitude or intensity of its impact. Some of us call this *foresight*, or *futures thinking*. It helps policy-makers in government devise strategies and formulate policies to maintain positive trajectories and shift negative ones into a more positive direction. The goal is to make better decisions today that can help shape the future, rather than to predict the future which would be a futile exercise anyway.

Scenario Planning

There are foresight methodologies – ways to think about the future systematically, and ways to help overcome some of our latent biases and our inherent cognitive constraints. One of them is the famous *scenario planning* method, which was developed and pioneered by the oil giant, Shell. In fact, by using scenario planning, Shell famously avoided the impact of the oil shock after an Arab oil embargo imposed in 1973 after the Yom Kippur War.

In the late 1980s, the Singapore government began using Shell's scenario planning techniques, starting in the Ministry of Defence (MINDEF).

Today, scenario planning is a key part of the Singapore government's strategic planning process. Indeed, the government takes scenario planning very seriously.

National scenario planning exercises are run every few years, and are even incorporated into the annual budget cycle. The resultant scenarios are used by ministries and agencies as a base reference for their own strategic planning.

The first effort at scenario planning at the national level in 1997 produced two scenarios – *Hotel Singapore* and a *Home Divided* – whose impact was profound. But they were particularly important then because, among other things, they helped to widen the focus of the government lens from geo-political and geo-economic issues to cover issues of Singapore society like ageing and social capital, local and community identity, and new fault lines. They led to the establishment of the National Volunteerism and Philanthropy Centre, and the Elderly Division in the then Ministry for Community Development. Their influence continues to this day.

Used intelligently, scenarios make people aware of problems, uncertainties, challenges and opportunities that such an environment would present – opening up their imagination and initiating learning processes. An example outside of government is *Action Plan Singapore*, a series of scenario planning exercises run by the Institute of Policy Studies (IPS) starting last year, covering skills, longevity and innovation.

The big benefit of scenario planning is that it helps to overcome our cognitive biases by surfacing hidden assumptions and challenging mental models. It helps planners and policy-makers to move out of their comfort zones, begin to think the unthinkable, and more willingly explore fresh strategies. Scenario planning helps to inculcate an *anticipatory mindset* in planners and policy-makers so that they instinctively raise *what if* questions on the issues they deal with. It helps them to overcome their blind spots, and to confront or at least be aware of black elephants.

Horizon Scanning

Notwithstanding these enormous benefits, scenario planning also has some limitations. Scenario planning is not very useful in locating the black swans and unknown unknowns that are lurking over the horizon.

The Nobel economist and strategic thinker, Thomas Schelling, explained,

“One thing a person cannot do, no matter how rigorous his analysis, or heroic his imagination, is to draw up a list of things that would never occur to him.”

To address this deficiency, even if only partially, in Singapore we have adopted other tools as well. While scenario planning remains the base, a wider range of foresight tools for *horizon scanning* are now deployed. Horizon scanning tries to identify the big game-changers by looking for emerging issues and trends, and delving into them to see where the threats and opportunities are.

To support this effort, the Singapore government also developed a computer-based suite of tools called the Risk Assessment and Horizon Scanning system, or RAHS. It is actually a pioneering big data system that is used to search for weak signals that could evolve into sudden shocks, among other things.

Collectively, these tools help planners to uncover and discover some – but certainly not all – of the black swans and unknown unknowns out there.

Wicked Problems

The complexity of our operating environment that produces black swans also produces *wicked problems*. Design theorists, Horst Rittel and Melvin Webber, described *wicked problems* as complex, large and intractable, with no immediate or obvious solutions. They have causes and influencing factors that are not easily determined *ex ante*. They hardly ever sit conveniently within the responsibility of a single agency. Worse, they have many stakeholders, each of which sees these problems from different perspectives, and who have divergent goals. This means there are no immediate or obvious solutions, because nobody can agree on what the problems are in the first place, never mind what the solutions should be.

It is not at all difficult to find wicked problems. They include the big challenges of our age, such as climate change, the environment, population, urbanisation, inequality, and so on. Most crises are wicked problems. There are many stakeholders, but they have competing perspectives, different opinions and divergent interests. Please one and you upset many others. Solve one problem and others will arise.

Terrorism is a particularly wicked problem. Some of you might be surprised by this assertion, because you would think that all of us want to get rid of terrorism – except of course the terrorists. But even if everyone agreed on how to distinguish terrorists from legitimate freedom fighters, and there was consensus that terrorism should be banished, it is not clear that any policy prescriptions would gain universal acceptance. If that were the case, terrorism would not be the persistent problem that it is today, and the Islamic State would not be such a serious threat.

The German sociologist, Ulrich Beck, once wrote that,

“The world has become so complex that the idea of a power in which everything comes together and can be controlled in a centralised way is now erroneous.”

It means that there is no single agency in government that is really equipped to deal with a wicked problem in its entirety. But, letting departments tackle different parts of a wicked problem on their own often leads to duplication or to waste and sub-optimal policies, and even to new wicked problems.

The Dangers of Reductionism

Efforts to understand our complex world and to deal with wicked problems often rely on an assumption – that what is complex can be reduced to simpler subsets that are easier to evaluate, and that when re-aggregated, will produce results that approximate the real world.

This approach is *reductionism*. It is rooted in the belief that complex phenomena can be analysed in component – and simpler – parts. The assumption is that after these parts have been analysed separately, it is then possible to understand the properties of the whole in terms of the properties and the interactions of these components. This assumption informs much of

the methodology of modern science today. It led to the tendency to dissect the complex world into smaller and less complex parts, and to favour explanations framed at the lowest level of scale.

Arguably in government, the assumption of *reductionism* results in a tendency to divide big problems into smaller pieces. It goes a long way to explain the proliferation of agencies and bureaucracies as standard response to emerging and wicked problems.

But despite the enormous importance of this approach, it gives the false impression that investigating the features of things at a holistic level is less informative than investigating the properties of the components.

The Nobel laureate and physicist, Philip Anderson, argued against reductionism in his 1972 paper “More is Different”. He wrote,

“The ability to reduce everything to simple fundamental laws does not imply the ability to start from those laws and reconstruct the universe. In fact, the more elementary particle physicists tell us about the nature of fundamental laws, the less relevance they seem to have to the very real problems of science, much less to those of society.”

Indeed, outside the realm of science, reductionism has not been as effective in explaining phenomena in such areas as ecology and economics.

Conventional efforts to model complex systems – like the *Club of Rome’s* model of economic and population growth, published in 1972 in the seminal “Limits to Growth”, and which had a profound influence on the population policies of countries around the world, including Singapore – have often gotten it badly wrong because of the faults inherent in reductionism. They link parts of a complex system together, assuming that these parts interact with each other in a Newtonian fashion, with clear link between cause and effect. Unfortunately, we now realise that complex systems often defy such deterministic analysis.

Complexity science abjures reductionism for the study of how systems interact with other systems, how agents interact with other agents, and then how these lead to *emergent*, rather

than causal, results. Complexity science tools include agent-based modelling, which examines how autonomous agents interact with one another and influence system behaviour. These tools, when applied to economics and to other areas like urban planning, provide fresh and useable insights that deterministic models have failed to produce. In Singapore, government agencies are beginning to use such tools to address complex problems in areas such as land transportation, health, and housing.

Net Assessments

Another way to counter the problems inherent in the reductionist approach is for the planner and policy-maker to look at situations – in particular, wicked problems – more holistically. This is important because, as many have observed, in our complex world, “everything is connected to everything else.” If we look at each issue from a narrow perspective, we will miss the wood for the trees.

At heart, this is also an argument in favour of enlarging our field of vision to see how economics, demographics, societal issues, issues of environment and of technology, interact with each other to produce the complexities of the operating environment – the same complexity that generates wicked problems, black swans and unknown unknowns. This is a more interdisciplinary and a counter-reductionist approach.

Given the complexity of our world, interdisciplinary collaboration is essential for solving the big challenges of today, in science and technology, in the social sciences, in the economy, in urbanisation, and in the environment. Why not also in geo-politics, geo-strategy and geo-economics? It is not possible, for example, to separate the conduct of foreign policy from other large national interests like economics and trade. So, there has to be a lot of internal coordination, and sharing of information.

To this end, inter-agency cooperation requires good leadership to grow. This is, in part, reflected in Singapore’s coordinating ministers, a position first established in 2003 with the appointment of the first-ever Coordinating Minister for Security and Defence. Now there are three coordinating ministers, who cover the entire spectrum of government functions – namely national security, economic and social policies, and infrastructure. The establishment of these three positions marks the transformation of the Singapore government from a traditional

hierarchy into a new age system of government, characterised by a Whole-of-Government approach.

Whole-of-Government

This transformation is significant, because the *Whole-of-Government* approach is an important response to managing complexity and dealing with wicked problems. The natural – but often inappropriate – reductionist approach would be to break down a wicked problem into smaller parts, and then leave it to each agency to make its own, decentralised and bounded decisions.

In contrast, an organisation that breaks down vertical silos encourages the spontaneous horizontal flow of information that will enlarge and enrich the worldview of all agencies. This in turn improves the chances that connections otherwise hidden by complexity, as well as emergent challenges and opportunities, are discovered early. It is an environment in which officers consider the spill-over effects of what they do and their impact on the policies and plans of other agencies. It is a mindset of willingly working together to achieve common national outcomes, instead of serving the particular interests of individual agencies.

Take once again terrorism as an example. No single ministry or government agency – not MINDEF or MHA – has the full range of competencies or capabilities to deal with this threat on its own. Instead, the efforts of many agencies have to be coordinated and brought to bear on this problem in a Whole-of-Government approach. This insight – and the looming challenge of transnational terrorism – led the Singapore government to set up the National Security and Coordination Secretariat.

Whole-of-Government looks eminently reasonable – on paper. But while Whole-of-Government may be an imperative for dealing with wicked problems, it is not easily achieved. Governments, like any large hierarchy, are organised into vertical silos. For Whole-of-Government to work, these vertical silos need to be broken down, so that information can flow horizontally to reach other agencies.

But this is a *Sisyphean* effort. Whole-of-Government is antithetical to a deeply-ingrained bureaucratic instinct to operate within silos. More insidiously, institutional identity is sometimes so strong that it colours how each agency views or prioritises national interests.

Richard Nisbett, in his book “The Geography of Thought” takes this argument one step further. He suggests cultural bias. For instance, Westerners tend to see the world in terms of individuals who are linked to others, and the surrounding environment, in axiomatic ways. From this emerges the emphasis placed in the West on individual rights and the rule of law. In contrast, East Asians – Nisbett refers primarily to the *Sinic* cultures – tend to see individuals, communities and their environments interacting more organically, in a dynamic ecosystem. Neither approach is more right than the other, but relying solely on either limits our ability to perceive problems from multiple angles. Extrapolating from this, it is not hard to see why one of the big challenges of government – especially the hierarchical Westminster Western model that the Singapore government is derived from – is the occurrence of bureaucratic silos, where information and coordination flow vertically, rather than develop horizontally. This is, in turn, an organisational impediment to the sharing of insights and information critical to thinking about the future.

This is a big hurdle to overcome. It requires not just a lot of effort but also a real change of culture to surmount this instinct to operate within silos, in order to make Whole-of-Government work properly. Often, the leader must *nag* his people to remind them that the Whole-of-Government imperative takes precedence over narrow sectoral interests and perspectives.

But this mindset is so important to good governance in a complex operating environment that the Whole-of-Government approach is today a priority of the Singapore government. There are inter-agency platforms that have been established to share information among ministries, statutory boards and other agencies, in order to take in different ideas and insights, so that wicked problems can be viewed in their manifold dimensions. Coordinating bodies now deal with cross-agency strategic issues, like the National Climate Change Secretariat and the National Population & Talent Division. Two years ago, the government set up the PMO Strategy Group with the mission of Whole-of-Government policy development and coordination. And most recently, the government announced the establishment of the Smart Nation & Digital Government Group to give a further Whole-of-Government push to the Smart Nation effort.

Urban Planning

At this stage, let me take up the issue of urban planning, a uniquely wicked problem for Singapore. While other countries have large land areas, which allow new cities to develop and replace other cities that may decline in relevance and fortune, Singapore, as a small city-state in an island, does not have that luxury.

Instead, urban planning in Singapore needs to take into account the challenge of packing in housing, green space, industrial land, commercial and retail space, land for transportation needs, and military training areas, all within the confines of a small island of 718 square kilometres. This is less than half the size of London, and only two-thirds the size of New York City.

In Singapore, the entire process of urban planning involves close collaboration among economic, social and development ministries and agencies. It also entails consultations with various stakeholders in the private sector and the general public. This Whole-of-Government approach enables all stakeholders to better understand interdependencies and implications of land use and strategic decisions.

Planning so far ahead and for multiple possible functions is inherently complex and invariably involves many uncertainties. So, national scenarios are used to factor in these uncertainties. Plans are also regularly reviewed. This process of long-term planning and regular review has enabled Singapore to anticipate its needs far in advance, and provides the flexibility to respond to surprises and to adapt to changes over time.

But such plans are only possible because of the embrace of a Whole-of-Government approach, in which trade-offs in land use are made among agencies. What is protected is not the narrow sectoral interests of the various ministries and agencies, but the larger national interest. It is not just a matter of coordination of roles and actions. At its core, Whole-of-Government means finding consensus on strategic priorities. Consensus is made possible because processes like scenario planning help align the government agencies to the larger national interests.

Whole-of-Nation

But with increasing complexity, the role of the government transforms from being a direct service provider, and becomes more of what the Manhattan Institute for Policy Research describes as a “lever of public value inside the web of multi-organisational, multi-governmental and multi-sectoral relationships”. This is sometimes called *networked government*, which refers to the management of the webs of relationships within and surrounding government. It is not just about strengthening the formal and informal networks within government, but also those outside of government, both locally as well as internationally.

For instance, government social services rely on collaboration with non-profit and community-based organisations. Examples like this do not indicate a diminishing importance of the government’s role. Instead, government may be understood as having multiplied its capabilities by extending its reach beyond its institutional boundaries.

A government that operates in a networked manner deploys mechanisms that promote reach within the whole nation. Tackling the *Jemaah Islamiyah* (JI) threat has been a wicked problem for Singapore. It is not just about removing the immediate threat that the JI posed to Singapore’s security. It also requires engaging multiple stakeholders, including community groups like the religious teachers who started the Religious Rehabilitation Group. It means engaging the private sector to help develop protective systems, processes and security infrastructure. This approach clearly needs not just many agencies of government coming together, but also bringing in the people and the private sectors.

In a way, it is not just a Whole-of-Government approach, but also a *Whole-of-Nation* effort. This is because the JI poses a multi-dimensional threat that requires not only collaboration among security agencies, but also with social agencies that have oversight of issues affecting local communities. The Singapore approach is to fight the JI network with *Whole-of-Nation* networks. This is networked government in action.

This Whole-of-Nation approach continues today with the SGSecure initiative, which is specifically targeted at building community networks. The SGSecure national movement aims to “sensitise, train and mobilise the community” as part of its response in the face of national threats.

Another example of the Whole-of-Nation approach is Our Singapore Conversation, a year-long process involving more than 600 dialogue sessions and nearly 50,000 participants. This process surfaced fresh insights for government – and for citizens – such as the desire for broader definitions of success or greater assurance about health care and retirement, that would otherwise have been much more difficult to obtain. It provided the basis for the government to update, revise and change policies in response to a changing environment.

Conclusion

The rise of complexity in the world today throws up enormous challenges for governments around the world. Black swans will confront them, and they will have to deal with wicked problems. Black elephants will be lurking in the background.

Foresight will help governments to better deal with complexity and its challenges. The concept of governance must also change, in tandem with rising expectations and a more educated and empowered citizenry. Government-by-Agency will evolve into Whole-of-Government, which in turn will embrace the broader Whole-of-Nation approach that includes business, civil society and the man-in-the-street. Collectively, these multi-sectoral actors will change the concept of governance, even if they are not part of “government”, traditionally defined. The future of governance in a world of complexity lies in such systems-level coordination.

But I should conclude by recounting Winston Churchill’s astute advice on the essential quality of a good government leader,

“It is the ability to foretell what is going to happen tomorrow, next week, next month, and next year. And to have the ability afterwards to explain why it didn’t happen.”

Thank you.

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