

IPS-Nathan Lectures

**The Challenges of Governance
in a Complex World
Lecture IV: The Future: Governance,
Unintended Consequences and the
Redemption of Hope**

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Governance and Vision

In June 1819, soon after founding modern Singapore on behalf of the British East India Company, Sir Stamford Raffles wrote,

“Our object is not territory but trade; a great commercial emporium and a fulcrum whence we may extend our influence politically as circumstances may hereafter require.”

Professor Mary Turnbull, who wrote the definitive history of Singapore, explained that Raffles wanted to “ensure Singapore’s prosperity as a great port, to abolish slavery and injustice, to devise a way of government giving ‘the utmost possible freedom of trade and equal rights to all, with protection of property and person’, and to make Singapore a beautiful and orderly city, the intellectual and educational centre of Southeast Asia.”

Given that Singapore in 1819 was truly a sleepy backwater with only about a thousand inhabitants, Raffles’ was a remarkably bold vision, which in the words of Turnbull,

“... reflected the most advanced radical, intellectual, and humanitarian thinking of his day. The type of society he aspired to establish in Singapore was in many ways ahead of contemporary England or India. And he established in Singapore a free port following the principles of Adam Smith and *laissez-faire* at a time when Britain was still a protectionist country.”

While Raffles and his successors may have laid the foundation of this vision, it would be another century and a half before another figure started to loom as large in Singapore’s history – Lee Kuan Yew – and who would give effect to Raffles’ vision, and deliver much more.

Of course, the trajectory of modern Singapore did not follow a straight line. There were many twists and turns, shaped in large part by gigantic forces outside the control of the colonial government. But in the last fifty years, it was political will, combined with pragmatic policies, effective governance, sheer grit and hard work of its people, and not a small dose of good luck, which gave Singapore the extraordinary chance to convert vision – not of Raffles, but of the founding fathers of sovereign Singapore – into reality.

The Law of Unintended Consequences

Since becoming independent, Singapore has taken a hard-headed approach to policymaking, unburdened by ideology, and driven by the stark imperative of survival. The government adopted a lean and efficient approach to public administration, involving the careful analysis of public policy issues, judicious use and adaptation of existing best practices, and strong government regulation. At the same time, it showed an exceptional willingness to eschew conventional wisdom and the politically correct, and instead to adopt pragmatic solutions – and leaps of faith – to deal with the *wicked problems* of the day.

Arguably, this approach could define good government and effective policy-making. But it is not a prophylaxis against the Law of Unintended Consequences. Governments – and public opinion – ignore the power of this law at their peril. Because of complexity, every government will sooner or later have to face the unintended – or unforeseen – consequences of its decisions. This is because in a complex world, conditions and assumptions that underpin policies and plans change over time, and that presupposes that the assumptions were even correct in the first instance. This leads to policies and plans having effects that are unanticipated or unintended, and outcomes that cannot be easily predicted. Of course, there are other reasons for unintended consequences, including sheer stupidity, blind spots, and other cognitive failures.

The Great Sparrow Campaign

A famous illustration of this law is the *Great Sparrow Campaign*, sometimes referred to as the *Four Pests Campaign*. During the *Great Leap Forward*, Mao Zedong launched an initiative to get rid of rats, flies, mosquitoes and sparrows – the eponymous four pests. Sparrows were considered pests because they fed on grain. So, Mao ordered the culling of sparrows. But nobody then seemed to have realised that sparrows not only feed on grain, but also eat locusts as an *avian delicacy*. By culling the sparrows, a delicate natural balance was upset, and soon there were not enough birds left to eat the locusts. As a result, locust swarms took over the countryside, devouring entire crop fields in their path, resulting in starvation, and contributing to the *Great Chinese Famine*.

Singapore's Population Policy

Singapore has not been immune to the Law of Unintended Consequences. Like many other developing countries, Singapore's population growth in the early years was high. In 1965, Singapore's total fertility rate – or TFR – stood at 4.66. The birth rate was 29.5 per thousand people. The concern then was that Singapore's population – which stood at 1.8 million in

1965 – would climb to an unmanageable five million people by 2000. Like many other governments around the world, Singapore's was fearful of the potential *Malthusian* impact of high population growth, and so the government acted decisively to slow it down.

So, the government began a campaign to encourage smaller families. In 1966, the Singapore Family Planning and Population Board (SFPPB) was established, and the government launched the National Family Planning and Population Programme with the key public message of a "small family". In 1972, the government began its phenomenally successful "Stop at Two" campaign. Within three years, the birth rate had plunged from 23.1 to 17.7 in 1975, falling even beyond the target of 18.0 per thousand.

But the low birth rate soon turned into a cause for concern. This unintended over-correction arose in part because the policy was implemented ahead of developments in Singapore that have since been found to correlate with low birth rates – such as higher education and employment opportunities for women, and rapid poverty reduction and income growth. In effect, Singapore became a developed country in demographic terms, well before it became one in the economic sense.

Lessons of Human Nature

Social policies are particularly susceptible to the Law of Unintended Consequences, as human behaviour and societal changes are often shaped by deep, hidden and interconnected forces that – because of complexity – might not be fully apparent for years.

This is where governments often run into the limitations of conventional policy levers. Public policies are aimed at changing overt human behaviour, such as imposing fines to deter littering. But they are often unable to tackle and shape its deeper aspects. For example, the government's *Productivity and Innovation Credit* scheme – or PIC – that was meant to incentivise businesses to raise productivity and boost innovation, was also extensively "gamed" – or abused, if you will – eroding the scheme's impact.

Furthermore, decision-making in government is constrained by cognitive limitations which define our human nature. This is because of what Nobel economist Herbert Simon called *bounded rationality*. The rationality of an individual is constrained by the information that he has and the finite time he has to make a decision.

This challenge is accentuated in a hierarchy, including government. The decision-maker at the top receives all the information and makes the decisions. But because of bottlenecks caused by bounded rationality, the decision-maker is either surprised, with all his cognitive synapses saturated, or he lacks sufficient bandwidth to comprehend the full scope of the problem. This means that the decision-maker cannot possibly make a fully rational and optimal choice. Instead he will very often choose a course of action that “satisfices” – it is somewhat acceptable, but not optimal.

This means that our human nature renders decision-making an imperfect process – one that even in the best of circumstances, does not lead to the optimal choice, but to one that is only reasonable. Taking into account the challenges of complexity and the Law of Unintended Consequences, it leads to the depressing conclusion that government policies and plans cannot always be right, and certainly not for all time.

But this does not mean that we should sit on our hands in the face of such problems. Instead, we should approach such matters with a huge dose of humility, prepared to shift course and maintain an open mind. Having unintended outcomes does not mean that the policy was flawed in the first instance, or should not have been implemented. But it does mean that governments must be willing to change tack or even to reverse course if the policy appears to be drifting off course. Running pilots and experiments would also help.

The larger point here is that translations from policy intent to content and then to outcome are often not straightforward. When things go wrong, as they often do, how do we respond? Do we just look for someone to blame, or do we work to solve the problem? A blame-seeking culture can be both destructive as well as unproductive. It might satisfy a human impulse to hold someone accountable. But it certainly does not solve the problem.

The Future is Unknowable

“The past is a foreign country; they do things differently there.” This elegant and elegiac opening line in L P Hartley’s 1953 novel, *The Go-Between*, is probably better remembered than the novel itself. It speaks to the essential reality of human existence that things are changing and moving forward, rather than staying still.

Understanding the future is hard. It has yet to unfold or come into being. The great financier J P Morgan was once asked what the market would do. His learned reply was, “It will fluctuate.”

We can guess what the future may be, but we face the same challenge as when we try to understand a *foreign country* – we cannot help but project our implicit assumptions. In thinking about the future, too often we take up one change that we think is powerful and important, and leave everything else as it is. So, we end up with a view of the future that is essentially an extrapolation of today.

This is because of an inherent linearity in our causal reasoning. There is plenty of research in cognitive psychology which show that we struggle to understand non-linear relationships, and tend instead to think in straight lines. We assume that there is proportionality between cause and effect – that is, big causes will have big consequences, and small causes only produce small consequences. This linearity often means that planners and policy-makers focus on the major forces in the social, economic, technological, political and environmental spheres.

But some future states of the world are difficult to anticipate because they emerge out of developments that we may have overlooked, or because of developments that we know about, but whose interactions generate unforeseen outcomes.

High-tech “gurus” often confidently predict the “next big thing” on the basis of straight-line guesses or extensions of existing trends. But history has shown us that the way future technologies will interact with one another – and with users – has an emergent property, and is not always predictable from previous developments.

Instead, it is important to consider the world in all its dimensions – not just in politics and economics, but also society, culture, community, technology and the marketplace.

I recall vividly a meeting with Chris Anderson, the former editor-in-chief of WIRED magazine. He told me that almost all of the magazine’s editors were liberal arts graduates, and not Science, Technology, Engineering and Mathematics – or STEM – graduates. The reason for this was that the liberal arts graduates were found to be best able to connect the dots – linking technology trends with social currents – in a way that those schooled in single, discrete disciplines could not. The insight I drew from this is that in order to thrive in a complex future, we will need to manifest and match that complexity in our mix of backgrounds, skills, ideas, and perspectives.

Who Are We?

One common assumption when thinking about the future is that “we are who we are”. But in that future, we would be changed, too. Our interests, habits, experiences, and expectations would be different. There is much that changes slowly in human society. Our cultural underpinnings are some of the slowest things of all to change, but even culture changes. And the further out we go, the more that future will be a truly foreign country.

During *Our Singapore Conversation*, Singaporeans discussed their hopes and concerns about the future. But they took their identity as Singaporeans mostly as a given. Reflecting on the process, Minister Heng Swee Keat said,

“We realised and learnt just how diverse individuals and groups are in our society and yet how much we share and value in common as Singaporeans.”

Similarly, when the Urban Redevelopment Authority develops the Concept Plan for land use over the next four or five decades, it assumes implicitly that our current identity as a nation-state in a city, in an island, will continue.

Changing Identity

Yet identity can and does change. Just in the past century, Singapore had gone from being a Crown Colony in the British Empire; to *Syonan-to* or *Light of the South* during the Japanese Occupation, to being part of Malaysia, and then the Republic of Singapore after Separation.

This is more than about changing names. It is also about how people see their lives and their sense of place. Many saw themselves as sojourners in Singapore when it was a Crown Colony, not citizens. But many of them and their descendants today see themselves as citizens, Singaporeans in Singapore their home. So, the answer to the seemingly innocuous question – “who are we?” – may change in the future, opening new situations, and new options.

Indeed, long-lived successful companies often reinvent and redefine their identities. One might argue that this process is part of what helps them survive, that reinvention of identity builds resilience and *antifragility*, qualities that I touched on in my second lecture. When Steve Jobs and Steve Wozniak incorporated Apple Computer Inc. in 1977, the company only made personal computers. Thirty years later, in 2007, Apple renamed itself Apple Inc. It

was a subtle but important acknowledgement of the changes that Apple had undergone. By then, Apple was making more than *Macs* – it also made *iPods* and the *iPhone*. It would later go on to make the *iPad* and develop the *App Store*.

Singapore as a Charter City

In an Op-ed published in *The Straits Times* in January this year, Benjamin Gussen, a law lecturer at the University of Southern Queensland, gave an example of how Singapore could redefine its identity. It could provide the infrastructure for a *charter city* in Australia, which would attract Singaporeans and migrants from other parts of Australia. In a charter city, the governing system is defined by its own charter document, rather than by state or national laws. In Gussen's view, this would offer Singapore and Singaporeans space beyond current physical and political boundaries. The charter city would be a global city that would also boost growth in Australia.

To be sure, only a few charter cities have sprung up. Paul Romer, the current World Bank Chief Economist who champions the idea, cites Shenzhen and Hong Kong as examples of charter cities. But even if this specific idea may not gain much traction, it raises this possibility – that the *idea* of Singapore need not be confined to this small island.

Virtual Singapore

Imagine what identity would mean in a future where people live not just in the physical world, but through Virtual Reality (VR) and Augmented Reality (AR), also live in alternate worlds, part real, part virtual.

Is this science fiction? Maybe not. The propensity to spend a large part of our waking hours in a virtual world is already here. A *Nielsen* report last year revealed that the average American adult spends 10 hours 39 minutes staring at a screen each day. Last year, people the world over – including in Singapore – witnessed the astonishing phenomenon of pedestrians walking about blindly – *smartphone zombies* – oblivious to the danger of traffic whizzing around them, totally absorbed in tracking down *Pokémon* in the AR game, *Pokémon Go*.

In March this year, Elon Musk, the CEO of Tesla and SpaceX, launched a brain-computer interface start-up called *Neuralink*, which is developing a “neural lace” technology that would involve “implanting tiny brain electrodes that may one day upload and download thoughts.”

He later spoke of “some high bandwidth interface to the brain ... that helps achieve a symbiosis between human and machine intelligence.”

In such a world, what would identity mean? If the individual inhabits virtual worlds for much of his waking hours, connected through avatars on his smart devices, or linked through some version of Elon Musk’s “neural lace” technology, then where is his emotional and psychological centre of gravity? In the old days, the emotional space that the individual occupied coincided exactly with the physical space that he lived in. But in future, this alignment may be disrupted by advances in digital and even neurological technologies. Do we embrace this future, as a nation, accepting then that the notion of national identity may change, or at least become more ambiguous? Or should we repudiate it? The answer lies in our fundamental attitudes to the future.

What Can We Influence?

By population and geography, Singapore is truly small. We see ourselves as price-takers.

Because we are a small country, we often speak as if the future were a car speeding toward us – we can swerve, or we can run backward. But we can scarcely control the car. In my second lecture, I spoke about how Singapore, in its short history, has experienced change not as a *velocity*, but as an *acceleration*. The world changes and affects us. We adapt, or perish.

Prime Minister Lee Hsien Loong captured this view in a speech at the Singapore Institute of Technology in October 2016,

“We know the world is changing. You cannot predict how. You cannot predict when. But you must gird ourselves for whatever might happen, and adapt to new conditions as they come up.”

The Innovator’s Dilemma

There are good reasons for this view. Examples abound of successful organisations that fail. Some failed to discern changes or failed to change. One example is *Nokia*, a classic case study of Clayton Christensen’s “Innovator’s Dilemma”. Nokia was the market leader when Apple introduced the iPhone in 2007. It was an early adopter and driver of 2G technology, a world leader in both supply chain management as well as global brand-building. It was the first handset manufacturer to target the bottom two-thirds of the global

income pyramid. Nokia was among the first to understand the importance of ease of use, design, and of mobile phones as lifestyle products. As a result, half the smartphones sold around the world then were made by Nokia.

But by 2010, this figure had fallen to one-third. Nokia failed to develop the software and smartphones to compete with Apple and Google. It had failed to see that the mobile internet was a practical option, and it could not find a credible response to the iPhone and Android OS. It even rejected the development of a Nokia App Store. It was the beginning of the end. Eventually, Nokia threw in the towel and sold its mobile phone business to Microsoft in 2013.

Influencing the Future

We need to consider how we can influence change – how technology develops and impacts us, and how markets are created and change. There are good reasons to focus on structural changes. History is emergent. Among the many possible paths that history could have taken, the interaction of structural factors and human agency led it down one path.

If we relaxed the constraints of Singapore as a price-taker, what new options to reinvent ourselves could we consider?

One view of technology is that it will advance and affect us – but as an external and often frightening force. We say that technologies, such as Artificial Intelligence and robotics, will “disrupt jobs”. Jobs will be automated, so we must prepare ourselves. Robots may be alienating, so we must mitigate these risks.

The sentiment that technology is beyond human control and frightful finds expression in art. Victor Frankenstein creates a sentient being who kills people. In the 2004 film, *I, Robot*, robots try to take over the world. In the 2015 film, *Ex Machina*, the humanoid robot, Ava, outwits her creator and escapes into the world, leaving viewers to imagine the consequences.

Yet, people and societies do shape technology. Japan is investing in robotics – to shape how the field advances. Rather than build cold metallic objects to disrupt jobs and society, it wants to integrate robots in everyday life, as if they were *social beings*. The Japanese have taken robots and made them soft and cuddly – turning “objects” into “social beings”. And perhaps not surprisingly, because in the Shinto religion, even inanimate objects can have a soul.

Japan's "New Robot Strategy" of 2015 envisages a "robot barrier-free society", where robots teach foreign languages, set tables and help the elderly walk and go out. Rather than develop virtual assistants – say along the lines of Apple's *Siri* or Amazon's *Alexa* – the Japanese firm *Gatebox* has built *Azuma Hikari*. She is more virtual companion than assistant – a theme explored in the 2013 film, *Her*. *Azuma* comes "alive" as a holograph, advises her master to take an umbrella when there are prospects of rain, and nags him to come home soon during the day.

Another area where it is easy to accept things as a given is about markets. One view of markets is that businesses need to adapt. So, if the demand for business class seats weakens, companies such as Singapore Airlines may want to diversify into budget airlines. If the demand for fossil fuel weakens amid climate change, oil majors such as Shell may want to diversify into renewables.

Luxembourg

Yet people and societies can also create and shape markets – even small societies. Fewer than 600,000 people live in Luxembourg. Ten times as many people live in Singapore. Yet Luxembourg is creating a market for harnessing resources in space. In November 2016, it introduced a bill to let companies own resources, such as platinum, obtained from space. It has set aside €200 million to support asteroid-mining companies. It has attracted two US firms, *Planetary Resources* and *Deep Space Industries*, to set up offices in Luxembourg as part of efforts to nurture this new market out of the Grand Duchy.

Lest these efforts to create a market seem like a *moon-shot*, Luxembourg has experience – it founded and invested in Société Européenne des Satellites (SES) in 1985, launching its own space industry. Today, SES is one of the largest satellite operators in the world.

The case against technological or market determinism is not an argument for ignoring realities – our small population, our small land mass, or the region in which we live. It is an argument for striking a balance between adapting to the world and shaping it. Our Smart Nation efforts offer us a chance not just to adopt technology, but also to shape it to serve national priorities – an idea I described in my second lecture – and to create markets for integrating technology, governance and what people need or want.

Where Are We?

Thomas Friedman has described our world as “flat”. Everything is linked and connected to everything else. Globalisation and advances in transportation and communication technologies have put nations, peoples and enterprises in touch with one another as never before.

But there is another metaphor used by Richard Florida, who argues that the world is “spiky”, not flat. His argument is that higher value-added activities are densely concentrated and clustered in hubs – what he calls the mega-regions of the world. These hubs and connectors of the world have superseded nation-states as “natural economic units”.

Singapore as a Hub in the Global Network

Singapore is part of a flat world. But it is also part of a spiky world. Singapore is today a global and regional hub of many things. Since Raffles’ time, Singapore has been an important trading and maritime hub between East and West. Singapore is also a major connector in international aviation, and a key node in the global financial system.

But Singapore’s position as a hub is neither unassailable nor pre-ordained. History shows that hubs come and go. Malacca used to be the centre of the spice trade in Southeast Asia. Venice was the centre of East-West trade throughout the Middle Ages. Rangoon, now Yangon, was the aviation hub of Southeast Asia before 1962.

Is it important that we are a hub, a peak among the valleys in a spiky world? Simply defined, hubs are the exceptionally well-linked nodes in a *network*. Throughout history, hubs have been the main engines of economic growth and development. Network theory provides insights to explain why hubs acquire wealth more easily than other nodes in a network. The world’s economic geography is dominated by hubs which are the focal points of opportunity, growth and innovation. Firms locate to where skills, capabilities and markets cluster. Capital flows to where returns are greatest, and highly skilled talent move to where opportunities lie.

This was what happened in Venice, which I touched on in my third lecture. As a city primarily concerned with trade and commerce, Venice was not a major producer of artistic and scientific talent. Instead, it imported talent – *foreign talent*. Attracted to Venice’s wealth and position as an intermediary between the East and West, artists and scientists flocked to the city during the Renaissance, making it a vibrant hub of culture, ideas and scientific

knowledge. Today, Singapore's approach to attracting top talent to boost the R&D sector echoes the Venetian example.

Today's economic geography is also dominated by hubs. They are defined as places that claim significant economic capacity, substantial innovative activity, and highly skilled talent. Singapore is one of these hubs. Contrary to Tom Friedman's flat world thesis, the existence of hubs reflects the reality that both economic activity and innovation are highly concentrated, and become more so as one moves up the economic ladder. Economic activity continues to cluster around highly-connected hubs. In this spiky world, the tallest peaks – the hubs – will continue to flourish and grow higher, while the valleys will languish. In other words, the rich hubs at the peaks get richer, while the poor in the valleys stay poor. This is the *power law*. This means that in a network, there will always be just a few densely-connected nodes – or the hubs – and many more nodes with only a few links.

The Hub in a Future Networked World

But even then, the nature of hubs will change. What will a hub look like in future? It would be fatal to assume that the density of connections that Singapore has today and the centrality that it enjoys in today's networks – whether in air transportation, maritime, or other networks – are permanent.

When we think of our place in the world, we often think about physical geography. The British set up a free port in Singapore because it is located on the trade route between India and China. The epithet, "Little Red Dot" is today a badge of pride for Singapore and Singaporeans. Singapore is represented on maps as a red dot. Our sense of geography connects with our feeling of vulnerability and advantage.

Yet this sense of geography is based on a particular kind of map. Modern maps relate one place to another in terms of longitudes, latitudes and borders. They look at the world from a bird's eye view.

But this has not been the only way of viewing one's place in the world, as Benedict Anderson, the historian and political scientist, writes in his book on nationalism, "Imagined Communities". Ancient Thailand had two kinds of maps – *diagrammatic guides*, which helped people make war or set sail, using distances measured in terms of marching and sailing times. But it also had *cosmographic maps*, which guided people on less tangible, even spiritual journeys. Singapore is much less adept at this second type of cartography.

One could say that we represent our place in the world in maps to serve our needs. If we relaxed our constraints of physical geography, and imagined new maps that transcend physical territory, what new opportunities might open up? And how can these new opportunities help us to reconceptualise our map of the world? The charts in Parag Khanna's *Connectography*, for example, point to the growing influence of data flows in shaping our "map" of the world.

The Impact of Digital Technologies

In the recent past, Singapore tried to overcome its small physical size by tapping into space abroad – such as Suzhou Industrial Park, Iskandar Malaysia, and Batam, Bintan and Karimun. It was – and is – a network strategy with Singapore as the hub.

But, new digital technologies will create new and different networks with their own hubs and connectors. If 3D printing – or *additive manufacturing* – successfully transitions to large-scale manufacturing, it could significantly reduce global shipping activity, negatively affecting all aspects of the port and shipping industry, including the transshipment market that Singapore's position as a global hub port is based. In one study, PwC estimates that up to 37% of the ocean container business is at risk because of 3D printing.

So, whether we will continue to be a hub in the networks that emerge in future will depend not just on our capabilities, but also on our ability to seize early mover advantages, and on how quickly we create and attract links to Singapore in the new networks that emerge.

If such changes occur, we may need new maps to complement old ones. I would like to examine two ways in which our needs may be changing.

Rethinking Borders

First, we often think of economic competitiveness based on nations, demarcated by borders. One nation is more competitive than another in a particular sector. This view made sense when nations traded goods – whichever had a comparative advantage in making a product ought to make it, to the benefit of all.

The economist Richard Baldwin, however, says that the *flows of know-how* have grown more important in the past two or three decades, as communications technology improved, and enabled coordination from a distance.

The worker in Ho Chi Minh City, Vietnam, or Zhengzhou, China may not know how to design, manufacture and market a product. But the multinational corporation – or MNC – does. By training the worker and his manager, the MNC taps into cheaper workers and land. Consciously or unconsciously, it adds them to global value chains. “The contours of industrial competitiveness are now increasingly defined by the outlines of international production networks rather than the boundaries of nations,” Baldwin writes.

This may mean working more closely with major companies and cities that are part of the production networks, whether to develop new products and services, orchestrate these networks or even shape where and how these networks develop.

Baldwin speculates that improvements in communications will enable other flows – even those of high-touch services, such as seeing a counsellor, or working with a physiotherapist – across national borders. Remote medicine, where patients interact with doctors in a different location, is already practised. Today, *Rio Tinto* manages its mining operations remotely. In the future, digital platforms can tap into labour based abroad, without even setting up a Singapore-supported industrial park abroad. Such platforms, like *Konsus*, already exist. *Konsus* matches high-end independent contractors or freelancers with projects, including when the freelancer and the project client are based in different places. If cross-border supply of services increases, Singaporeans may be able to work with co-workers and clients based abroad, as if they were physically present in Singapore.

Singapore under the British thrived because of its status as a free port. In contrast, Jakarta – then known as Batavia – languished under the Dutch because of onerous restrictions placed on traders and the Dutch policy of controlling and taxing trade. Being well-connected and plugged into dense networks confers far more advantage than efforts to monopolise production or control access to resources. The Portuguese in Malacca – and later the Dutch – sought to control the spice trade by collecting monopolistic rent in Malacca and by limiting access to the spice-producing islands. While this generated short-term profit, it backfired in the long-term as merchants sought to by-pass Malacca for less restrictive ports. The British, in contrast, maximised their commercial power by linking up its empire with ocean cables, the telegraph system, railways and canals, with the Suez Canal being the most important. They created the first truly global market and controlled the sea lanes with just “five keys” that were said to lock up the world – Singapore, the Cape of Africa, Alexandria, which commanded access to the Suez, Gibraltar and Dover.

The basic approach is to ensure open access and maximum connectivity. Just as Sir Stamford Raffles made Singapore a free port in 1819, welcoming traders from any country, Singapore in 2017 could welcome data from any country – a free data port. It could allow data centres in Singapore to hold data governed by the laws of another country, as if it were stored in the source country. This would anchor the data in Singapore, allowing local-based companies to harness insights from data. Such rethinking of borders will grow in importance in our increasingly digitised and data-driven world.

Rethinking Connectivity

Second, the flows of data will accelerate. It is not just the data that we generate on *WeChat* and *Facebook*. Machines will communicate more with each other. Complexity economist Brian Arthur describes machine-machine communication as a “huge interconnected root system”. These interactions and interdependencies take place underground, out of sight, but enable actions that we care about. Mobile phones communicate with GPS satellites to pinpoint our location so that Grab drivers can find us, without our being aware that this communication is taking place.

If the movement of data from one IP address to another will matter more in the future, nations may need to reconsider how to plug themselves into these flows, given the possibility that countries will protect the sovereignty of data. Some countries are already mandating that data about their citizens is stored locally. Others are setting rules on the transfer of data across borders.

Today, Singapore manages its relations with other states, through the diplomacy and the conduct of foreign policy. In the future, it will need to manage relations with a wider range of entities – with digital conglomerates, with cities, and even with other countries – in the digital space. This will not be without precedent.

Denmark is reported to be creating the position of technology or digital ambassador – that some have dubbed the “Silicon Valley Ambassador” – in order to better engage digital firms, such as Apple, Google and Facebook. This is almost as if technology was its own country, unlike the present and certainly the past.

Although the role is still being fleshed out, Danish Foreign Minister Anders Samuelsen explained the need for greater engagement by citing recent investments in Denmark by Apple and Facebook, increasing data usage, and attendant issues of privacy, and “fake

news". For Singapore, such an approach would build on our earlier efforts to partner other cities and sub-national regions to plug them into international production networks.

Reinventing Singapore as a Global Hub

Changes in technology, trade routes and geo-politics can gradually diminish a city's or a country's hub position. Hub positions are not invulnerable despite the many advantages that incumbency confers. The commercial power of Venice declined after Christopher Columbus' discovery of the New World and Vasco de Gama's discovery of a sea route to the Orient. The example of Venice suggests that global hubs like Singapore need to diversify their offerings and constantly re-invent themselves to remain relevant.

Estonia – A Harbinger of the Future

From medieval and Renaissance Venice, let us turn to a much more modern example. Estonia is a Baltic state of 1.3 million people. It borders Russia, making it all the more diminutive. It is ageing, like Singapore, and even older – 19% of its population was aged 65 years and above in 2015, higher than 12% in Singapore.

Despite its size, location and age – or perhaps because of these factors – Estonia has been turning itself into a digital society. At birth, the doctor puts the Estonian baby's details into the medical records – and so his digital identity is born. That digital identity now allows an Estonian to sign private contracts, access public services and databases, pay taxes, and vote. In the 2015 parliamentary election, 30% of votes were cast over the Internet. By cutting trips to public offices and banks, for example, the digital society is estimated to save Estonia 2% of GDP yearly.

Beyond the digital society, Estonia is also re-creating itself as a "virtual nation". First, it is trying to back up its computers and databases, so that the Estonian digital society can continue to function, even when cyber-attacks or physical attacks occur. In 2007, online banking was crippled, and emergency services almost disabled, in a massive DDOS cyber-attack on Estonia. This took place amidst a row with Russia over the relocation of a Soviet-era statue. To build robustness, Estonia is now experimenting with "digital embassies", where data is stored on servers in its embassies abroad. It is also developing ways to migrate data to commercial servers, such as those hosted by Microsoft, as back-up in the event that cyber-attacks take place.

Second, Estonia introduced e-residency in 2014. You may be Indian, South African or Singaporean. You may live abroad. If you become an e-resident of Estonia, you can use some of the digital services available to Estonian citizens, such as setting up an Estonia-based company. E-residency helps Estonia generate business activity for Estonian companies, from independent contractors to small companies with clients worldwide. More than 18,000 people have since become e-residents.

Estonia hints at how nations could redefine their identities, and what it means to be a nation, in a digital era. Benedict Anderson, whom I cited earlier, argues that a nation is an imagined community. E-residency may one day build another “Estonia” – an imagined community beyond borders and time zones. Digital embassies are about ensuring the survival of a country's way of life, beyond physical borders.

“The concept of a country has changed,” says Taavi Kotka, Estonia’s former chief information officer who led the e-residency initiative. “Land is so *yesterday*. It doesn’t matter where you physically live or operate. That is how the game will change.”

Is Kotka right? Or will geography and territory have the final say? Perhaps the question should not be cast in such binary terms. Singapore is already simultaneously a nation-state and global city. To consider Singapore also as an extra-territorialised entity, expanding the concept of our reality to encompass abstract bits and data flows, merely reinforces the paradox that we already are.

Where Next?

It was Singapore’s great fortune to have had two remarkable visionaries in its short history of two centuries – Stamford Raffles, the founder of modern Singapore, and Lee Kuan Yew, the father of independent Singapore.

The question is whether Singapore should tempt fate, and leave it to luck that another great man will emerge to lead the nation to even greater glory? Or whether we should create the conditions that will allow Singapore to extend its exceptionalism for as long as possible into the future?

I am of course inclined to the latter, not just because I believe that passivity opens us to greater turbulence, and increases the likelihood of strategic shock. It is also because I believe that action creates hope. Hope is the fuel that energises society, but hope also

needs action to make vision become reality. As Bill Willingham wrote in the *Fables* series, “Hope isn’t destiny. Left passive, it’s nothing more than disappointment deferred.”

Our founding fathers’ grand vision and great hopes for Singapore were always accompanied by action. This is the difference between hope and paranoia – the latter has a crippling capacity to cause all action to be for naught, while the former propels reasonable, thought-out action with measured optimism.

The central question that is posed in this evening’s lecture is whether Singapore is merely a price-taker, or whether it has the ability to influence and alter the factors that shape the future?

A thread running through all these four lectures – and this evening’s in particular – is a hopeful view that even small city-states can influence, shape, and even create, not just markets, but also their operating environment. It is a belief in this view that hope can be redeemed for even a *little red dot* like Singapore.

As a parting shot, let me outline two reasons for this belief. First, I do not want to trivialise Singapore’s very real constraints. But these very constraints are our opportunities. Resource constraints matter more to us because we are small. We also have less room for systematic policy error in a world that is increasingly VUCA. But it is precisely our smallness that gives us agility, the ability to course-correct, and to iterate with more freedom and dexterity, than much larger entities. We have greater ease of coordination, to actualise the *Whole-of-Nation* approaches that I mentioned in my first lecture, since we can actually galvanise society within our small space. We have greater ease of implementation, and great ability to test, iterate, experiment and prototype, because we do so within limited geographical bounds. And as a small state, we have greater ability to course-correct if we happen to embark on policy at scale that turns out to have been wrong or misguided.

Second, we should remember that responding to complexity, uncertainty and accelerating change are not alien to us. It is in our very DNA as a country, and rooted in our origins both as a sea port founded by Raffles and well as a nation led by Lee Kuan Yew and the other founding fathers. No one expected us to survive but we did. We defied rules, expectations, stereotypes and existing categorisations when we eschewed import substitution, courted MNCs and embarked on multicultural meritocracy when most of our neighbours were mercantilist and communalist. Both Goh Keng Swee’s vision of a thriving open economy

and S Rajaratnam's vision of being "Singaporean by choice and by conviction" were audacious, reflecting a unique brand of *gung-ho* political entrepreneurship. My belief in the redemption of hope should not be seen as something new to Singapore. It is within each of us, and with a little effort we can reclaim it.

Of course, there are conditions attached. Prime Minister Lee Hsien Loong alluded to one of them when he spoke of his wish for a sense of "divine discontent", which I take to mean never being satisfied, never being complacent that we have arrived.

Of course, it is hard to change the identities that we are familiar with – who we are, where we are, and what is within influence. Yet changing identities is part of what it means to grow. You are not the same person that you were a decade ago, and hopefully you are the better for it. The winds of change provide an opportunity for us to reinvent ourselves.

We need courage and imagination. Courage to change the identities with which we have grown comfortable with, to re-write the stories that we tell ourselves about ourselves, and imagination to come up with different identities. We should not feel that our success in future is derived from what we are today. If we can achieve such courage and imagination, then there is a basis to hope for a better future that is yet to exist.

This courage and confidence to embrace changes and opportunities together as a nation, rests on our sense of shared agency, values, and destiny – a shared future. A key source of Singapore's strength has always been our people's trust in fair competition and just reward for effort and achievements, compassion for the unfortunate, and a restless yearning for continuous progress. The points on trust and compassion bear emphasising. This has to be carefully fostered by the leadership because, without it, it would have been impossible for our leaders to forge consensus on far-reaching policies and tough trade-offs between different priorities, interests, and groups.

From this interplay between internal hope and external forces of change, combined with vision and good governance, the future – our future – will emerge. As the 13th century Persian poet and scholar, Rumi, memorably wrote, "The garden of the world has no limits, except in your mind."

Thank you.

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