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THE ATLANTIC, THE PACIFIC, GLOBAL LEADERSHIP AND THE FUTURE OF EDUCATION

ESSAY

Michael Barber,
Katelyn Donnelly and
Saad Rizvi

August 2012

Institute for Public Policy Research

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ABOUT IPPR

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FOREWORD

MICHAEL BARBER, KATELYN DONNELLY, SAAD RIZVI

There is much debate in academic and intellectual circles about whether we will see an 'Asian' or a 'Pacific' century ahead, or whether the US will emerge from the doldrums and lead in the next century as it did in the past one. This paper takes a different perspective. We take as a point of departure the fact that, after 350 years of Atlantic leadership of the global economy, we will see the Pacific rise. At the very least, the Pacific will share that leadership.

The questions we focus on and the debates we believe necessary are: What kind of leadership will the 21st century require? To what extent is the Pacific region ready to provide this leadership? And what are the implications of the answers to these questions for public policy in the region and for education systems in particular?

Our answers to these questions emphasise the importance of innovation. Innovation drives economic influence; economic influence underpins global leadership; and global leadership requires innovation to solve the many problems facing humanity in the next half century. If this is correct, and innovation is the key, then even the best education systems in the world, many of them clustered around the Pacific, need to radically rethink what they offer every student.

This philosophy of everyone as an entrepreneur and innovator is not what underpins education anywhere in the world right now. If the Pacific region is to provide global leadership, or a large share of it, then education systems there face a major challenge of transformation. This is the case we make here.

This paper is the result of constant dialogue among the authors as we've worked together, first on education reform in Pakistan (in which we are still involved), and second as part of an innovative team at the heart of Pearson, the world's largest education company, where we are seeking to resolve the dilemmas of providing quality education to people of all ages on every continent. In addition, we share a restless curiosity and an insistence on evaluating the world we live in.

We want to draw attention to two specific aspects of our dialogue. The first is that each of us was born and raised on a different continent – a European, an American and an Asian – and each therefore brings a

different perspective. In addition, all of us have worked and travelled in many locations around the world. Of course, we are still no more than three individuals seeking to understand the complexities of the 21st century, but we do have at least some capacity to bring a global perspective to bear on the issues.

Second, our dialogue is intergenerational – Michael as a 50-something engaged in vigorous debate with Katelyn and Saad, two 20-somethings. As our debates rage, we have a feeling, perhaps borne out by some of the recent literature on creativity and innovation, that intergenerational dialogue is potentially highly productive in inspiring innovation, and ought to be consciously developed by organisations that want to thrive in the 21st century. For this reason, Michael suppresses his periodic tendency to wish that his younger colleagues would show deference, while Katelyn and Saad smile sympathetically at Michael's attempts to come to terms with modern technology.

For the same reasons, we share equally the responsibility for the resulting paper and for any errors that remain.

Michael Barber
Katelyn Donnelly
Saad Rizvi
August 2012

1. LEARNING FROM THE PAST: HOW INNOVATION SHAPED THE WORLD

On 22 October 1884, a gathering of 41 delegates, the great and the good representing 25 countries, met in Washington to solve a problem. Of those 25 countries, Russia, the US, Chile and Mexico had Pacific coasts, but only Japan and 'the Kingdom of Hawaii' could be considered fully Pacific in orientation. Their problem had become increasingly pressing as international trade, which now included steamships as well as ships under sail, expanded. The delegates wanted a global agreement on a sound basis for the lines of longitude and, therefore, time zones. They chose, unsurprisingly given the extent of the British empire at the time, to put the international meridian line through the observatory at Greenwich in London. An incidental result of the decision was to put the international dateline through the middle of the Pacific Ocean. They congratulated themselves on the fact that the dateline ran from pole to pole almost entirely through water, not land. They did not note – simply because it was so obvious to them as not to be worth recording – that by meeting in Washington to fix a meridian in London they were making a clear statement of Atlantic supremacy. The Atlantic Ocean was the ocean at the centre of the global economy. The Pacific, divided by a dateline, and a very long way away, was an afterthought.

The rise of the Atlantic

For almost half a millennium, starting from the Spanish conquest of Mexico in 1519 through to the mid-20th century, the assumption of Atlantic superiority made in 1884 by the grandees in Washington had a sound basis in fact. The constant flow of silver across the Atlantic from Cartagena (in modern Colombia) to Seville (in modern Spain) sustained the Spanish superpower well into the 17th century. By the early part of that century, France, Holland and England were beginning to see the wider opportunities of the Atlantic economy. Silver brought benefits to Spain, no doubt, but it also brought inflation and a dependency that, in the modern world, we have seen in the oil economies. Trade, by contrast, brought much more general wealth.

Inspired first by a desire to disrupt the Spanish, then driven by religion, Spain's rivals discovered the profits of trade across the Atlantic. In 1582, Richard Hakluyt, an English advocate of the colonisation of America,

argued that profits would follow 'if first we seek the kingdom of God.'[1] Two decades later, Samuel Champlain, founder of French Canada, who crossed the Atlantic an incredible 27 times in his career without losing a single ship, argued for exploring the St Lawrence river because 'commerce [most especially the lucrative fur trade] could be carried on by means of the great river'.[2] On 3 July 1608, he founded Quebec to exploit the opportunity. The Dutch took a fleeting interest in the Atlantic trade, but saw more profits from the spices available in the East, hence the spectacular (at least in retrospect) decision in 1667 to accept from the English 'the forgotten island of Run … in the backwaters of the East Indies' in return for an island in North America equally unknown at the time – Manhattan.[3] Dutch painters, though, fully understood the importance of the Atlantic – the famous hat in Vermeer's *Officer and a Laughing Girl* was made of beaver pelt from Canada.[4] From the early 17th century onwards, Atlantic trade took off, generating prosperity initially on the European side of the ocean, but from the late 17th century, in North America too.

As Daron Acemoglu and James Robinson argue (in *Why Nations Fail*), the growth of the Atlantic trade in the 17th century spawned a merchant or capitalist class in England that demanded limits to the power of the monarch. Trade across the Atlantic grew steadily in spite of the almost uninterrupted conflicts between Britain and France in the 18th century, including the American war of independence. Ultimately, these developments created the conditions in which, from the mid-18th century, the industrial revolution took off. This in turn strengthened the Atlantic Ocean as the centre of the global economy, with trade volumes increasing dramatically as American cotton was sent to northern England to be spun and manufactured, and then distributed across the globe in British ships. By the time of the Washington conference of 1884, the trade across the Atlantic had long since included grain from the great prairies, shipped across the Great Lakes and along the Erie Canal to New York, and from there across the Atlantic to feed Britain's rapidly growing population, with manufactured goods often flowing the other way. Railways soon replaced canals, and the volumes of trade continued to grow.

Crucially, the expansion of trade in goods drove a corresponding expansion of trade in ideas. Indeed, as the Atlantic trade developed, scientific thinking took off, and the room for public as well as private dialogue and debate, enhanced by cheaper print and newspapers, grew exponentially. What is broadly termed the Enlightenment – everything from Isaac Newton's laws of motion to Voltaire's mocking of religion – along with a growing educated elite living in towns and cities rather than

1 Brigden 2000: 278
2 Fischer 2008: 238
3 Milton 1999: 363
4 Brook 2009: 29ff

on landed estates combined to create innovation in age-old processes, whether in agriculture or manufacture.

By the middle of the 18th century, the dialogue about innovation was both European and, crucially for the argument we are making here, transatlantic. To visit Thomas Jefferson's home in Monticello, Virginia (and to trace the source of his debts) is to see the extent to which the great American sage was steeped in transatlantic debates about rights, democracy, science and arts. To visit the Royal Society of Arts, still on the Strand in London, is similarly to discover the transatlantic dialogue involving Benjamin Franklin – a hero in Paris and London as well as Philadelphia – about the latest discoveries in an extraordinary range of human endeavour from transport and electricity to politics and religion.

In her wonderful book *The Lunar Men*, Jenny Uglow describes the intersecting lives of a handful of men (not yet women) in the English Midlands who created the Lunar Society to discuss the rapidly changing world in which they lived. Among them were Joseph Priestley, who discovered oxygen through an experiment in his own kitchen; James Watt and his collaborator Matthew Boulton, who transformed the steam engine into a driving force of the industrial revolution; Josiah Wedgwood, who industrialised pottery; and Erasmus Darwin (grandfather of the even-more-famous Charles), who was a pioneer in medicine, botany and poetry. What the record shows, even more powerfully than the achievement of any of the individuals, is the amazing curiosity and creativity of the dialogue between them, not just in the monthly meetings of the Lunar Society, but in their voluminous correspondence, much of which relates to events across the Atlantic. Indeed for Joseph Priestley, crossing the Atlantic itself was an experiment. Why was it – he wanted to know – that it took longer to get from Britain to America than to do the same journey in reverse? The result of his musings was the discovery of the Gulf Stream.

Implied in Uglow's account is a model of innovation which emerged in the mid-18th century and still has relevance today. Each of the 'lunar men' exhibited extraordinary curiosity. Nothing was accepted at face value and traditional religious explanations were questioned. They debated endlessly amongst themselves, describing their latest ideas, and invited critique from their friends. At the same time they did not leap to condemn any idea that at face value seemed crazy or impossible; instead they suspended disbelief and found ways to test their ideas scientifically. They connected subjects and themes across traditional boundaries – steam with mining, geology with pottery, science with politics. They kept detailed notes on everything they did, both for the record and to encourage reflection. Crucially too, inventors and entrepreneurs collaborated with each other so they could think simultaneously about the product and profit, always looking not just for the application of new ideas but for the ability to take them to scale. One steam engine

was exciting, but many steam engines – which transformed mining, then cotton manufacture and finally transport – were epoch-making. Meanwhile, the growing market economies on both sides of the Atlantic increasingly made their manufactures affordable to the burgeoning middle class. Demand and supply grew together in a virtuous circle.

The Lunar Men immediately saw that what they were doing had revolutionary potential. 'The English hierarchy,' wrote Priestley, 'has … reason to tremble even at an air-pump or an electrical machine.'[5] By 1767 he was turning this into a much wider political manifesto: 'Let us be free ourselves, and leave the blessings of freedom to our posterity.' Government, he argued, should be a servant, not master of the people: 'the good and happiness … of the members of any state is the great standard by which everything relating to that state must finally be determined.'[6]

The drama of the American and French revolutions still lay ahead as Priestley made this case, but the strong association between science and innovation on the one hand and freedom of expression and an inclusive society on the other were already clear. Here lay the foundations of the extraordinary dominance of the Atlantic economy right through into the second half of the 20th century. Global leadership was a result of economic influence; and economic influence a result above all of the extraordinary capacity to innovate. Needless to say, this dominance did not come without a price – the barbarity of the Atlantic slave trade for example, and later the evils of colonialism with which the Pacific Asia region became all too familiar.

The argument here is not one of any moral superiority. Rather it is that power follows economic growth, economic growth follows innovative capacity and, in the 17th and 18th centuries, the Atlantic societies, with Britain in the lead, arrived at a set of circumstances where innovation was let loose. We are still coming to terms with the consequences. In 1500 it would have been hard to predict that western Europe, still less North America, would dominate the world by 1800. The Ottoman empire or China might have had better claims. By 1700 the die was cast. The keys to this dominance were openness and competition – openness to trade, openness to scientific evidence, openness to ideas and openness to differences of view; and at the same time competition between countries for wealth and influence. The combination caused a great leap forward in innovative capacity. As if to prove the point, Britain, France, the Netherlands and the US, among the Atlantic powers, made this leap; Spain and Portugal, both of which had begun the 16th century with immense advantages over the others but which stultified growth through oppressive monarchies and tradition-ridden religious hierarchies, did not.

5 Uglow 2002: 77

6 ibid: 169

If a single moment captured the symbolic dominance of the Atlantic Ocean, it was perhaps when President Franklin D Roosevelt and Prime Minister Winston Churchill met on board USS *Augusta* in Placentia Bay, Newfoundland in August 1941 to agree what became known as the Atlantic charter. Even though the US had yet to join the second world war, it was a statement of war aims in which the two powers committed themselves not just to abjuring territorial aggrandisement in the event of victory, but also to self-determination and freedom. Needless to say, the postwar reality sometimes fell short of these noble aspirations, but the association of the Atlantic Ocean with freedom was nevertheless sealed.

The slow emergence of the Pacific

Writing in the early 19th century, the great English poet John Keats imagined the moment when Europeans first laid eyes on the vast Pacific Ocean:

> 'Or like stout Cortez when with eagle eyes
> He star'd at the Pacific – and all his men
> Look'd at each other with a wild surmise
> Silent, upon a peak in Darien'[7]

But of course to many others the Pacific was not a new discovery. Between 1405 and 1433 the Ming emperors of China had sent the great explorer Zheng He on several expeditions along China's Pacific coasts and far beyond to the Arabian Gulf and the east African coast, but after that the voyages ended and the rulers of China focused inland on the vast Asian continent around them.

Meanwhile Europeans, having connected the Atlantic Ocean to the Indian Ocean in the 15th century, now connected the Atlantic to the Pacific and became the first to circumnavigate the world. By 1582, Jesuit priests, led by Matteo Ricci, had crossed the South China Sea and reached China in the hope of converting its people to Christianity. Few converts were made, and when Ricci died in China, his tomb was inscribed 'To he who came to China, attracted by our justice system...',[8] an early indication that China expected to teach the west, rather than the other way around. In the late 16th century the Spanish also colonised the Philippines and the first tentative trade across the Pacific began. For 250 years the Philippines were administered from Mexico City and seen as a distant outpost of the Spanish Empire. A paltry trade among the Spanish colonies themselves and between them and China developed, but not remotely on the scale of the transatlantic trade that emerged in the 17th and 18th centuries. This was, rather, trade within or between overwhelmingly closed systems.

7 Keats, 'On first looking into Chapman's Homer', lines 11–14, See http://www.poetryfoundation.org/poem/173746#poem

8 Laven 2011: 242–3

Until the late 18th century, when the great English explorer James Cook made his three voyages to the Pacific, much of the ocean remained uncharted water. Following that 'fatal impact'[9] between Britain and the Pacific, the ocean was opened up, not least by the whaling industry whose epic expeditions created the myth of Moby Dick while simultaneously destroying the huge whale fisheries. Then came the California gold rush, following the discovery of gold in the hills near San Francisco in 1849. The telegraph, invented just a few years earlier, ensured the news spread rapidly and soon miners, speculators and bounty hunters in the various service industries that followed, rushed across the Pacific to California, from Chile to the south and China to the west. Until the Trans-Continental railroad was completed in 1869, the overland route from the east coast of the United States to California was far more laborious and dangerous than crossing the Pacific; a reality beautifully captured in Isabel Allende's novel *Daughter of Fortune,* set in Valparaiso and San Francisco.

Within a few years, the black ships of Commodore Perry had opened up the closed empire of Japan to the international trade in goods. The combination of steamships and railways, along with the telegraph, began to transform the speed and volume of international trade, and by 1873, the great French writer Jules Verne could confidently publish his famous work *Around the World in 80 Days*. The hero, Phileas Fogg, crosses the Pacific on a steamship in 22 days from Yokohama to San Francisco, a journey that would have been unthinkable only a few years earlier.

Even so, in trade terms, the Pacific remained a backwater compared to the Atlantic, where trade flourished at an unprecedented rate. From 1865 there was a transatlantic telegraph cable, ensuring that not just news but share prices and other vital economic data crossed the ocean almost instantaneously, thus further catalysing the burgeoning trade of goods and ideas.

Not every ruler welcomed this 19th century communications revolution and their reluctance held back the development of the Pacific economy while that of the Atlantic flourished. Japan actually turned its back entirely on such developments until the 1860s, while China was at this time traumatised by the evils of colonialism and its own upheavals, caused by a combination of weak emperors, internal conflict and rebellion. The Emperor of Austria-Hungary – an almost landlocked empire with little influence on either the Pacific or Atlantic – spoke for many autocrats of the time when he said of railways: 'I will have nothing to do with them, lest the revolution might come into the country.'[10] His contemporary, Tsar Nicholas I of Russia agreed, for years allowing only a 17-mile stretch of railway from St Petersburg to his palace at Tsarskoe

9 Moorehead 2000

10 Acemoglu and Robinson 2012: 226

Selo. His adviser, Count Kankrin, dismissed railways as a luxury: 'they encourage unnecessary travel from place to place.'[11] This deep conservatism explains in part why the Trans-Siberian railway, which opened up Russia's Pacific coast, was completed in 1916, only a year before the October revolution.

By the turn of the 20th century, the recently opened-up Japan was beginning to emerge as a significant regional power. In 1904–05 it inflicted a heavy military defeat on the Russian Empire, hastening the descent into revolution there. Meanwhile, when Theodore Roosevelt sent his newly developed navy of 16 battleships into the Pacific in 1908 he was making a statement to the world that from now on the US would be a power in the Pacific as well as the Atlantic. With more battleships than the next two largest navies put together, only the British exceeded US influence in the Pacific; the two Atlantic powers in effect saw the Pacific as just another extension of their supremacy. When, a generation later, Franklin Roosevelt and the British prime minister published the Atlantic charter, perhaps they imagined that once the second world war was over, the Atlantic's global dominance would continue undiminished. The creation of the North Atlantic Treaty Organisation (NATO) on 4 April 1949 might suggest this was the case, particularly as its creation coincided with the end of Japan's imperial might and its rebirth under American occupation.

For a while, perhaps, few would have questioned this judgment. Underlying shifts in influence happen slowly and are not always apparent, even to the best-informed commentators at the time. Only now is it becoming apparent that after more than 300 years, the second half of the 20th century saw the demise of the Atlantic era.

The rise of Pacific Asia

For perhaps a decade after the fall of the Berlin Wall in November 1989, one overwhelming fact seemed clear: the west had triumphed and there was just one dominant power in world affairs, the United States. The 1997–98 Asian financial crisis only reinforced this message.

'As the 20th century draws to a close,' claimed neoconservative thinktank the Project for the New American Century, 'the United States stands as the world's pre-eminent power.' As late as 2004, Charles Krauthammer was similarly hubristic in claiming that the domination of a single superpower was 'staggering' and had not been seen since the fall of Rome.[12]

In fact, with the benefit of a longer perspective, not to mention the economic travails of the west since the collapse of Lehman Brothers on 15 September 2008, we can see that the more important feature of the last decade of the 20th century was the emergence of Asia, especially Pacific Asia, as the economic powerhouse of the new global economy.

11 Acemoglu and Robinson 2012: 228–30

12 Quoted in Jacques 2009: 4

Japan, flattened by two atomic bombs in August 1945, had just 40 years later caught up with the west. While in the first half of the last century its aggression had left huge scars on East Asia, in the second half – after it had 'embraced defeat', in John Dower's telling phrase – Japan provided a model for the region.[13] Singapore, a barren, poverty-stricken city in 1965, had overtaken Europe in GDP per capita by the turn of the millennium; South Korea, ravaged by conflict in the 1950s and with a GDP equal to Ghana's in 1960, had also caught up; likewise, Malaysia, Indonesia, the Philippines and even Vietnam were on the move; while Hong Kong, which had boomed under British rule, continued to boom after its handover to the Chinese. Meanwhile, China, held back by a century of colonialism and 40 years of self-inflicted devastation, took off economically once Deng Xiaoping, in 1979, set the country on a path of economic liberalisation.

In 1960, Pacific Asia's share of global GDP was 9.1 per cent; by 2010 it was 22.8 per cent. In the same period, the US share had fallen from 38.3 per cent to 23.1 per cent and western Europe's from 28.9 per cent to 20.3 per cent. The average compound growth rate over that period for the US was 6.9 per cent, for western Europe 8.6 per cent and for Pacific Asia 10.0 per cent. The rates and phases of growth varied by country – for example Japan grew very rapidly from 1945 to 1990 and much more slowly thereafter, whereas China, which matched Japan for average growth per annum over the whole period, grew slowly until the early 1980s and then much more rapidly.[14]

Since the late 1990s, and especially since 2008, the spectacular growth of the Pacific Asian economy has continued to contrast with much more sclerotic growth, and sometimes recession, in the west. As if to underline the shift in economic leadership, during 2011 EU leaders hinted that a bail-out of the struggling euro currency by China would be welcome. Then in early 2012 China's leaders provoked comment by downgrading their growth forecast to 7.5 per cent as the eurozone and Britain slipped below zero growth for the second time in four years. A fragile US economy was managing around 2 per cent growth at the same time.

Of course, one would expect faster growth from economies, such as those in Pacific Asia, which started from a much lower base. And even after those decades of spectacular growth, GDP per head in most of Pacific Asia remains far behind the west. Japan, Hong Kong and Singapore have either matched or exceeded the West but (as of 2011) GDP per head in China remains barely a ninth and in Malaysia barely a fifth of that in the US.[15] Nevertheless, average growth approaching

13 Dower 1999

14 World Bank Indicators, GDP (current $US). Pacific Asian countries included are (in alphabetical order): Brunei Darussalem, China, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, Papua New Guinea, Philippines, Singapore, Thailand, Vietnam.

15 World Bank Indicators, GDP per capita (current $US)

10 per cent per year across such a large area and over such a long period is unprecedented in human history and demands explanation. In an era when 90 per cent of all trade travels by water, you only have to look at the extent of activity in the harbours of Hong Kong or Singapore to see how the centre of gravity has shifted,[16] with Chinese demand for imported commodities the main driver in bulk-cargo shipping rates around the world. As of 2011, over 15 per cent of world exports can be accounted for by just three countries: South Korea, Japan and China.[17] If they formed a free trade area, as is mooted, it would be of greater economic significance than the EU.

There has been fierce academic debate about how to explain this phenomenon, but there is broad agreement too. Certainly in Japan, South Korea and Singapore – and more recently in China – significant credit is attributed to the state itself for creating the circumstances for this extraordinary growth. Leftwich[18] summarised the developmental state as a state with the following characteristics:

- a determined, relatively small and relatively uncorrupt elite with a clear vision
- a powerful, competent economic bureaucracy
- a weak and subordinate civil society
- effective management of non-state interests
- legitimacy based upon economic performance and the repression, therefore, of social pressures.

In short, a state managed by an expert elite was able to speed up development, aggregate capital and protect infant industries from potentially destructive external competition. In order to prevent the private sector from becoming inefficient in the protected environment, these states insisted that businesses set ambitious performance goals and demonstrated success in export markets where they had to compete against unprotected multinational corporations. Civil society was docile and did not get in the way.

Bill Emmott makes the point powerfully in relation to Japan:

> 'Ever since the modern Japanese state was built after the Meiji imperial restoration in 1866, the direction of influence and power has been clear: the state is superior to all other centres of power, and it has always been assumed to be doing the influencing, not the other way round.'[19]

As globalisation intensified, especially after the end of the Cold War, the state's role in the economy in Pacific Asia became more restricted than

16 See http://www.imo.org/About/Events/Rio2012/Documents/TCD%20Brochure%20-%20English.pdf
17 World Bank Indicators, Exports (% of GDP) and GDP (current $US)
18 Quoted in Ferdinand 2012: 112–13
19 Emmott 2008: 89

it had been, but it remained and remains more significant than, say, in the US or the UK and much more significant than the Washington Consensus – the liberalised, free market perspective that dominated the IMF and World Bank from the early 1990s – would have recommended. Now, of course, the Washington Consensus (another Atlantic perspective, incidentally) has lost its lustre.

Above and beyond the role of the state, the nature of Asian society also contributed to the extraordinary progress. Generally speaking, Pacific Asian cultures were more deferent to and accepting of the state and the authorities. For much of the postwar era, the traumas of the previous hundred years – war, conflict, famine and oppression among them – were living memories, and a Hobbesian social contract offering peace and order in return for liberty was welcome. Moreover, the strength of family ties, especially the extended family, meant that the state was able to rely on families to provide the welfare and benefits which western societies demanded from the state. As a result, tax levels could remain relatively low.

Meanwhile, in cultures which prized the collective more highly than the individual, people worked hard, saved for a rainy day and expected their children to work hard and succeed in school. Also, the distinctive corporations that developed, especially in Japan and Korea, became adept at making use of the accumulated human capital of their workers through, for example, Toyota's quality circles. These contrasted with the more individualistic attitude to skills in western companies that existed well into the 1990s. In all these ways, Pacific Asian societies were significantly different from those of the Atlantic. Exaggerating slightly to make a point, in the west people developed a 'rights' culture and asked what the state could offer them; in Pacific Asia they developed a 'responsibilities' culture and asked what they could offer the state. When Lee Kwan Yew, the first prime minister of Singapore, referred to 'Asian Values', this was what he had in mind. Combined with free-market incentives which allowed people to invest in the future of their families as well as their country, it helped drive the economic miracle.

Interestingly, as Pacific Asia's economies boomed (with the exception of those that opted out, such as North Korea and Burma), so too did economies on the other shores of the Pacific. In the US, the shift of economic might between 1960 and 2000 from the north and east to the south and west is plain. In spite of its challenges with governance, California is home not just to some of the world's greatest universities (Caltech, Berkeley, Stanford), but also to the most consistently innovative cluster on the planet in Silicon Valley. Further north on the Pacific coast, Seattle has been home to Boeing, Microsoft, Amazon and Starbucks, all in their different ways huge global success stories. The mayor of Los Angeles told Michael (Barber) once that his city did more trade with South Korea than Germany did. Seen from the port of Los Angeles, Shanghai and Hong Kong undoubtedly look more important

to the future than Boston or New York. Meanwhile, Australia, not least in response to the growth of China's economy, has boomed. In South America too, Chile, with its long Pacific coast, free markets and copper, has grown further and faster than its regional peers. Driven by its copper reserves, the shift in Chilean trade patterns follows the rise of Pacific Asia: Chilean trade with Asia represented 31.7 per cent of total trade in 2003, but rose to 47.8 per cent by 2010, while the US share of Chilean trade dropped from 39 per cent to 26.5 per cent and the European share from 29.6 per cent to 19 per cent in the same period.[20] Brazil too, though without a Pacific coast, has seen trade with China contribute significantly to its own growth.

The growth of China's economy since Deng Xiaoping opened it up in the early 1980s is the most overwhelming fact of all. It is not at all an accident that the opening up through the special economic zones began on the Pacific coast, learning consciously from the success of Singapore and Hong Kong. It made sense to begin the opening up of China in places such as Shanghai, Xiamen or the Pearl river delta. The facts of China's growth since then are staggering and are in the process of transforming the global economy.

Jonathan Fenby vividly illustrates China's incredible acceleration and massive economic influence in the wake of liberalisation.[21] China's share of global trade has quintupled between 2000 and 2010, up from 2 per cent to 10 per cent of total merchandise trade.[22] Although its total factor productivity is still lower than in the US, China's total productive capacity has increased 26-fold. China is now capable of producing more in two weeks than it did in a whole year in 1970.[23] As GDP soars, it has brought measurable improvements in individual livelihood. Annual per capita income rose from an average 528 yuan at the start of economic reform in the early 1980s to 19,100 in urban areas and 5,900 in the countryside by 2010.[24] With China's massive population, this represents real human progress: since 1980 half a billion people have emerged from poverty and 211 million people have been added to the global labour force.[25] University education, and its value, has expanded hugely. In 1982, none of the Politburo had degrees; in 2007, over 90 per cent of its members were colleged-educated.[26] By 2010, China had 18 per cent of the world's graduates in the 25-34 age group; by 2020 it will have 29 per cent.[27]

As a result, China's economic influence today is immense. With the largest monetary reserves of any country, at over $3.2 trillion, China has

20 Hetterich 2012
21 See Fenby 2012
22 ibid (Kindle edition): location 108
23 ibid: location 394
24 ibid: location 126
25 ibid: location 625
26 ibid: location 508
27 Coughlan 2012

three of the nine biggest banks in the world by capitalisation and three of the top five by profitability.[28] Chinese construction firms signed contracts worth $134 billion in 2010, 50 times the figure for 20 years earlier, and 54 of these companies appear on the list of the top 225 international engineering contractors.[29] As manufacturing and construction grows, China accounts for between 37 per cent and 45 per cent of global demand for nickel, tin, lead, zinc, aluminium and lead, and for 38 per cent of copper consumption. Estimates suggest that in 25 years China will demand more copper than is mined globally today.[30]

Moreover, Fenby cites forecasts that this massive growth will continue. China is expected to account for 40 per cent of global construction between 2012 and 2022;[31] the most recent five-year plan commits 7 trillion yuan to infrastructure between 2011 and 2015.[32] China is already the world's largest energy user, in addition to being the largest manufacturer of solar panels and a major source of new nuclear power. Meanwhile, it has already become the biggest market for cars and personal computers, with e-commerce turnover set to overtake the US by 2015 and the number of online shoppers expected to increase from the 145 million seen in 2010 to 348 million in 2014.[33] Since China is best understood, in Martin Jacques' term, as a 'civilisation-state' rather than a nation state, how this economic transformation will play out cannot be predicted with any confidence from the study of similar transformations in the US or Europe in the past.[34]

This unparalleled growth in China, combined with the wider success of Pacific Asia, accounts for a major part of global growth over the past 50 years. Between 1960 and 2010, global GDP increased 46-fold and global trade more than 100-fold, 23 per cent of which was driven by Pacific Asia. The influence of Pacific Asia has been most pronounced in the five years from 2005 to 2010, when it accounted for 32 per cent of global growth while the US and western Europe contributed only 11 per cent and 10 per cent respectively.[35] As Peter Ferdinand comments: 'The overall growth rate of Pacific Asia as a whole, over almost 50 years, has … been significantly higher than that of the United States, Western Europe or the world as a whole.'[36] One measure, albeit imperfect, of the accumulated might of Pacific Asia is that whereas in 1980 Pacific Asia held around 12 per cent of global foreign exchange reserves, by 2009 it held an extraordinary 57 per cent.[37] By contrast, Europe and America hold the debt.

28 Fenby 2012 (Kindle edition): location 139–157
29 ibid: location 352
30 ibid: location 132
31 ibid: location 893
32 ibid: location 105–106
33 ibid: location 402–405
34 Jacques 2009: 13
35 World Bank Indicators, GDP (current $US) and Exports (current $US)
36 Ferdinand 2012: 134
37 ibid: 131

The economic growth of the Pacific region has coincided with an early rise of innovation and research in the area. Chinese research and development alone has gone up 1,266 per cent between 1996 and 2008, according to the World Bank.[38] In fact, many American multinationals are responding to cheaper costs, fewer regulations and the tax benefits associated with research by moving their research to the region, providing $7.21 billion in research across the Pacific to Asia in 2008.[39] This has had a natural impact on the flow of patents – a proven indicator of innovative activity. Between 1996 and 2009, patent applications by residents in Pacific Asia increased by 56 per cent compared to a 10 per cent increase in western Europe. However, as Martin Wolf points out, much of the innovation in Pacific Asia is incremental and continuous – as with digital cameras – rather than disruptive,[40] whereas the US, and to a lesser extent Britain, remain pre-eminent in game-changing innovation – think worldwide web, the PC, the iPhone and so on. ('Designed by people in California. Assembled in China.' as it says on the back of every iPhone.)

Given these dramatic shifts over the past half a century, it seems plain that the era of Atlantic economic leadership has already given way to the Pacific. As Niall Ferguson puts it, rather dramatically: 'Is this the end of the West's world and the advent of a new eastern epoch?'[41]

The economics of the past decade should surely make one thing about the future clear: a simple projection forward of the economic trends of the past 20 years, while easily done, is highly unlikely to be even remotely accurate.

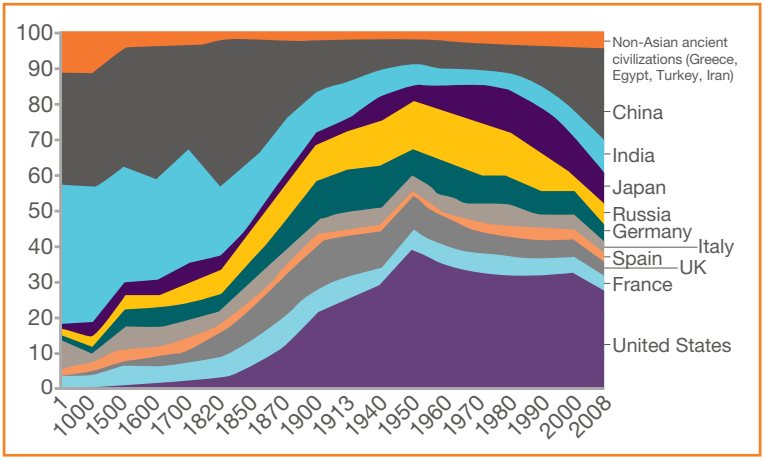


Figure 1
Economic history of China and other major powers 1–2008 AD (% world GDP)

Source: Statistics on World Population, GDP and Per Capita GDP, 1–2008AD, Angus Maddison, University of Groningen. Reproduced from Thompson 2012.

38 World Bank Indicators, patent applications by residents

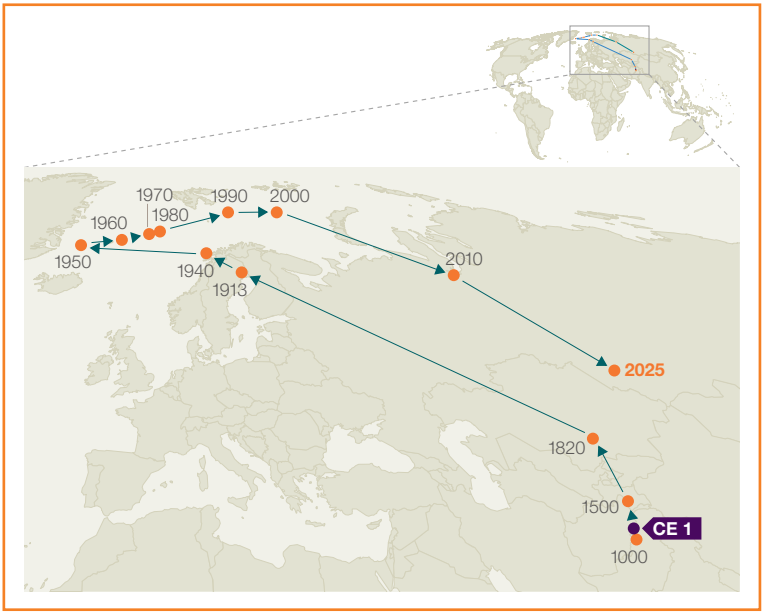
39 National Science Board 2012: 6

40 All quotes from Martin Wolf were made in personal interview with the authors, unless otherwise noted.

41 Ferguson 2012: xvi

As figure 1 shows, with the benefit of a longer perspective, what is happening is not so much a radical departure as a return to a very long-term trend. The McKinsey Global Institute makes the same point equally powerfully in the following simple map, which shows that by far the most rapid shift in the world's economic centre of gravity happened between 2000 and 2010.

Figure 2
Evolution of the Earth's economic centre of gravity (1 CE to 2025)



Source: McKinsey Global Institute analysis using data from Angus Maddison, University of Groningen; MGI Cityscope v2.0. Reproduced from Dobbs et al 2012.
Note: Calculated by weighting national GDP by each nation's geographic centre of gravity; a line draw from the centre of the earth through the economic centre of gravity locates it on the earth's surface. For detailed analysis, see the appendix in Dobbs et al 2012.

A sobering way to look at this transformation, especially for any westerner at risk of suffering from hubris, is to see it in the context of very long-term historical trends. Either way, the rise of China and Pacific Asia, and the implications this has for global leadership, is a major transformation of global circumstances that cannot be ignored.

2.
UNDERSTANDING THE PRESENT: THE CHALLENGE FACING THE NEW GLOBAL LEADERS

If indeed we are witnessing the eclipse of the Atlantic economy by the Pacific, what are the implications for the future? If the continuation of present trends ad infinitum is unlikely, what, among the possible futures, is more likely? Will the characteristics that explain the Pacific economic miracle of the past half century also secure sustained growth in the next? Or are the lessons of the rise of the Atlantic economy in the 18th century more relevant? Will the Pacific trajectory look more like Spain's, with its oppressive monarchy stultifying growth, or will it look like that of the US, with its open society and continued prosperity? And if the Pacific economy and its constituent parts are destined for global leadership in the future, what are the implications for humanity? What indeed does global leadership mean in the 21st century? What is required of it? And what can the countries with Pacific coastlines do differently, individually and collectively, to ensure a prosperous, fulfilling future for their people and humanity as a whole?

The expectations of global leadership

When the Atlantic economy rose to dominance, global leadership was barely a concept. It simply happened. Indeed, the word 'international' itself was only coined in the 1780s (by Jeremy Bentham). Over the course of the 18th and 19th centuries, it became apparent that forms of global leadership were required for practical questions such as the lines of longitude (decided, as we've seen, in Washington in 1884), or for more controversial geopolitical issues such as ending the slave trade or carving up Africa among the imperial powers. The wars of the first half of the 20th century revealed more strongly than ever the need for forms of global governance and global leadership, resulting in first the League of Nations after the first world war and then the United Nations following the end of the second world war. When the destructive might of modern weapons became terrifyingly apparent at Hiroshima and Nagasaki in August 1945, the desire to avoid their future use was a further powerful motivation for global leadership. Then as the 20th century drew to a close, other challenges, not remotely understood a century earlier, clamoured for a global order – issues such as climate change, the sustainability of the oceans, biodiversity and the regulation of the extraordinary scientific revolution symbolised by the cracking

of the genome. These were on top of the more traditional but no less monumental challenges facing humanity: the regulation of the global economy; the resolution of conflicts whether active, as currently in parts of Africa or Afghanistan, or frozen as in Kashmir or the South China Sea; and responding to global terrorism and the emerging phenomenon of failed states. Global leadership, which emerged naturally in the Atlantic during the 18th and 19th centuries, is now a necessity in the 21st. Serious challenges no longer end at the border of the nation state, and credible solutions depend on global decision-making.

All these challenges have emerged in a time of unprecedented population explosion, with the global population having passed 7 billion recently and heading for 9 billion by the middle of the century. If global leadership is to mean anything – whoever turns out to provide it – it surely means facing up to and hopefully overcoming these challenges in ways which enable all those nine billion people to live fulfilling lives and to do so in harmony with the planet's ecosystem, because the alternative is disaster. This is not to exaggerate, but merely to state the obvious in plain terms.

In conversation with Martin Wolf, the *Financial Times* columnist, we found ourselves combining Isaac Asimov's story *Nightfall*, about the end of a civilisation, with Ian Bremmer's case that we live in a G-zero world where for the moment there is no obvious leadership which can overcome the barriers to global cooperation on these major challenges; in such circumstances it is easy to become pessimistic.[42]

Michael (Barber) once asked a young colleague of ours – in his mid-20s – what he thought about when he thought about the 21st century. After all, Michael said, I shall be lucky to make it to mid-century but you have a good chance of surviving well into its second half. 'I think the second half of the 21st century will be fantastic,' came the reply. Then the young man paused before adding, 'if we get through the first half.' No one has ever summed up for us the challenge for global leadership more succinctly.

In other words, at the very moment when the centre of gravity of global leadership is shifting from Atlantic to Pacific, the task facing that leadership is much more difficult and pressing than ever before. Moreover, it is plain that the solutions to all those challenges cannot be met simply by doing more of the same. Clayton Christensen describes in *The Innovator's Dilemma* how dependence on gradual sustained improvements results in the downfall of companies; the same concept applies to nations and the global leadership as they tackle the challenges facing us. Innovation will be required – faster, deeper, more 'disruptive' innovation than ever before.

Since Joseph Priestley and Benjamin Franklin corresponded, scientific and technological change has been rapid and accelerating. The new technologies of the past 30 years – in information technology and

42 Asimov and Silverberg 1992, Bremmer 2012

the genome, for example – hold out the possibility of further dramatic improvements. Scientific and technological innovation will remain crucial and in any case seems unstoppable, which makes it simultaneously terrifying and inspiring, but it is another question again whether innovation in these areas will be directed at solving the most pressing global problems. The contrast between defence budgets and those for renewable energy suggests that so far this has not been the case. (Imagine for a moment that we were able to innovate as dramatically in our capacity to make peace as we are in our capacity to wage war.) Moreover, the next half century demands innovation in other spheres too – in social and economic realms and indeed, fundamentally, in human relations. Franklin Roosevelt commented, shortly before his death in 1945: 'Today we are faced with the pre-eminent fact that, if civilisation is to survive, we must cultivate the science of human relationships.'[43] His point is even more apposite now. Unless scientific and technological innovation accelerates, unless it is well-directed to the most pressing problems, unless there is also innovation in these more subtle and subjective domains, the future looks very bleak indeed.

The fundamental question, therefore, facing those who aspire to global leadership, whether in political, economic or other spheres, is how to create the conditions in which unprecedented innovation can take place. In 1945, three ageing leaders – Roosevelt, Churchill and Stalin, sitting at a table in the Livadia Palace in Yalta – thought that between them they could resolve the world's problems. In 2012 we know that leadership, even in the most centralised societies, is too dispersed, information flows too global, the speed from thought to action too fast for the massive problems of the 21st century to be resolved behind closed doors, however beautiful the location. Instead, leaders need to focus on creating the conditions in which the necessary innovations can take place, and in which countless individuals with leadership responsibilities are well-educated enough to make good decisions. The question facing the Pacific's leaders – gathered in September 2012 in Russky Island, off the coast of Vladivostok – is sharper still. If they aspire to global leadership, will the model of transformation that worked so well for the Pacific region between 1960 and 2010 deliver what is required for the next half century? Or, put another way, how could they create conditions that allow the innovation of the kind described to flourish?

The Pacific's innovation challenge

The extent of innovation that will be required to solve the world's problems in the next half century is unprecedented. As Julia Gillard, the Australian prime minister, has put it: 'Innovation is absolutely pivotal … Australia has to be in the innovation and global integration business.'[44] Her words are generally applicable. Global leadership will depend on innovation, not

43 Barber 2008: 51

44 All quotes from Julia Gillard were made in personal interview with the authors, unless otherwise noted.

just for the economic growth which will sustain it, but also to rise to the massive challenges ahead. Accelerating the pace of innovation to meet this challenge will require great diverse cities, great universities, great new and established businesses and extensive interactions between them. It will depend on individuals who are open to ideas and argument and who are part of teams in which vigorous debate, dissent and discomfort exist. It will require a culture of openness – to argument and ideas, experts and outsiders, the young and the new. It will also require states which, as Tony Blair told us, have predictable rules that are evenly enforced and do not have closed, elite circles.[45] In other words, to assume the mantle of leadership, as opposed to simply catching up with the west, the Pacific region will have to change and develop differently. There are powerful reasons to believe that what worked spectacularly between 1960 and 2010 will not work between 2010 and 2060.

The need to transform governance is often highlighted when commenting on how Pacific Asia needs to change, and it is true that a new approach to governance is needed. In ranking of press freedom, or lack of corruption, or the rule of law, much, but not all, of Pacific Asia lags behind the Atlantic region. The same is true of human rights. Sometimes criticism of these aspects of the region is dismissed as western lecturing, and no doubt there have been lectures, sometimes arrogant or even hypocritical. That misses the point of our argument here, though, which is that these are not characteristics to select or not as a matter of political choice; rather they are necessary elements of a truly innovative society. This is the case made by Eric Schmidt, former CEO of Google: 'We argue strongly that you can't build a high-end, very sophisticated economy with … active censorship.'[46]

It is not just in the area of governance that Pacific Asian societies may find they have limitations in relation to becoming truly innovative. There are also questions of culture. Many of the cities in the region, Seoul and Tokyo among them, are some of the most homogenous cities on Earth. The evidence suggests clearly that, as a result, they are likely to be much less innovative places than London, New York or Toronto. This homogeneity extends to the workplace and to gender as well as to ethnicity – Japan is ranked 57th in terms of gender equality globally (as an example, only 4.1 per cent of department managers in the country are women).[47] Economic studies have confirmed the linkage between diversity and innovation, both at the corporate level and beyond. Castellani and Zanfei show that openness and international orientation correlate positively with propensity to innovate,[48] and McKinsey has demonstrated that publicly-listed companies with the highest level of

45 All quotes from Tony Blair were made in personal interview with the authors, unless otherwise noted.
46 Quoted in Rogin 2012
47 Kitayama 2010
48 Castellani and Zanfei 2006: 97

gender diversity outperform their sector on both operating results and stock price growth.[49] In essence, leaders in Pacific Asia will have to rise to the challenge of embracing a more diverse society and the free exchange of ideas that enables it to thrive.

Likewise, income inequality, while a global phenomenon, particularly plagues parts of Pacific Asia, especially among those in charge of governance. The richest 70 members of China's legislature added more to their wealth last year than the combined net worth of all 535 members of the US Congress, the president and his cabinet, and the nine Supreme Court justices. While the rate of wealth increase in China is high, the absolute net worth is also striking: the net worth of the 70 richest delegates in China's National People's Congress rose to 565.8 billion yuan ($89.8 billion) in 2011, a gain of $11.5 billion from 2010, according to figures from the Hurun Report, which tracks the country's wealthy.[50] That compares to the $7.5 billion net worth of all 660 top officials in the three branches of the US government. Per capita income in China, however, is about one-ninth of that in the US.[51]

Moreover, Pacific Asian societies value order, respect for authority and submission of the individual to the group much more highly than western societies. Indeed, with justification, these qualities are often offered as part of the explanation for Pacific Asia's rise in the past, not least by Asian leaders themselves. A former prime minister of Singapore, Goh Chok Tong, said:

> 'Societies can go wrong quickly. US and British societies have changed profoundly in the last 30 years. Up to the early 60s they were disciplined, conservative with families very much the pillar of their societies. Since then, both the US and Britain have seen a sharp rise in broken families, teenage mothers, illegitimate children, juvenile delinquency … We in Singapore intend to reinforce the strength of the family.'[52]

And Lee Kwan Yew, Singapore's almost legendary leader, offers the definition of pragmatic governance in these cultural circumstances: 'I choose a solution which offers a higher probability of success, but if it fails, I have some other way. Never a dead end.'[53]

The solutions, in other words, are worked out behind closed doors by experts working for the leader and then tested in the real world and refined as necessary; a rational process not inhibited by the messy realities of the Atlantic democracies. The facts speak for themselves. Lee Kwan Yew did a wonderful job, but he did so assuming a deferent

49 See http://www.mckinsey.de/downloads/publikation/women_matter/Women_Matter_1_brochure.pdf
50 Shanghaiist 2012
51 World Bank Indicators, GDP per capita ($US)
52 Quoted in Ferdinand 2012: 68
53 Plate 2010: 47

society and that – as the quote makes clear – it was his role as his country's leader (as pater familias in fact) to make those big decisions. Singapore's election in 2011, however, suggests the traditional approach to decision-making there is becoming anachronistic.

So, in the next phase when innovation of the kind we have described is the order of the day, could these same qualities and approaches to governance become barriers? Malcolm Gladwell brilliantly documents how deference led to a series of plane crashes with Korean Airlines in the 1960s.[54] Co-pilots were unwilling to challenge the authority of the pilot, even when they saw impending disaster. He also documents how, to its credit, Korean Airlines overcame the barrier by actively countering deference in its pilot training. But the very fact that it required such a sustained effort by the airline reveals how deeply this cultural trait is embedded. Yet innovation requires iconoclasts rather than footsoldiers.

Similarly, while order clearly has its value, innovation often results from more chaotic circumstances, unplanned interaction, messiness or, in the key phrase, at the edge of chaos. By definition, societies or organisations whose preference is for hierarchy, order and control find it difficult to tolerate chaos – in fact, the instinct will always be to prevent it arising.

And again, loyalty to an extended family has been a powerful feature of Pacific Asia's rise, enabling governments to invest less than they might otherwise have done in welfare provision, but the same characteristic is ambiguous when the goal is a truly innovative society. Family loyalty, deference to the elder members and especially the father figure, along with the respect for tradition and the unwillingness to go out on a limb, are all more likely to stand in the way of innovation than to encourage it. In short, a combination of uniformity, deference, attachment to order and the strength of the family, each of which has contributed to success in the past, might stand in the way of Pacific Asia's success in the future.

Family culture spills over into business culture in Pacific Asia. In Japan and Korea this leaves a legacy of very large, often family-run enterprises that have special access to funding and the government. In Korea, the 'Chaebols' are the enterprises that have dominated industry for the past 50 years. They employ a large mass of the Korean population and many who work for them assume they will never work elsewhere. They are cared for and protected by these large companies. But the Chaebols have not always had smooth sailing, and in the tempestuous economy of the next 50 years, will need to change radically if they are to survive at all. Meanwhile, in Japan, while the major corporations remain remarkably innovative, producing 20 per cent of the world's patents, there is widespread anxiety that the young are turning in on themselves and are not ready to carry the burden of the future. Combine this with its ageing and declining population (children were 35 per cent of Japan's

54 Gladwell 2008: chapter 7

population in 1950; now they are a mere 13.5 per cent[55]), and the productivity challenge ahead for Japan looks immense.

Meanwhile, on the other side of the Pacific, while innovation seems to be thriving in California there are other problems. The inability of the US to answer its immigration question is causing problems for businesses and universities alike. In 2011 there were 720,000 foreign students studying in American institutions.[56] Many of these students competed within their countries for an opportunity to come to the US – representing some of the best talent in the world. This is illustrated by the fact that from 1990–2005 immigrants founded over 50 per cent of start-ups in Silicon Valley and from 1990–2000 they won 26 per cent of US-based Nobel Prizes, despite representing just 13 per cent of the population in 2005.[57]

By contrast, the US Citizens and Immigration Service issues work visas to only 85,000 of these immigrants per year through a lottery system. Businesses have to follow suit – the number of foreign analysts at the McKinsey New York office fell from nearly 50 per cent in 2007 to less than 5 per cent in 2008, illustrating a huge loss in diversity and talent. On the national scale, the cost of these restrictions to the US is incredible: the Technology Policy Institute estimates that denying visas to foreign graduates of US universities resulted in a loss of $13.6 billion in GDP between 2003 and 2007.[58]

Meanwhile, California public schools, which 40 years ago led the world, are now among the worst in the US, which itself compares unfavourably with much of Pacific Asia. Government has become paralysed, unable to raise taxes, unwilling to cut spending and therefore constantly failing to address a burgeoning deficit. Underlying the gridlock is a set of spending choices which border on madness in a state which seeks to lead the way in innovation. In 1990, California spent twice as much on universities as it did on prisons; now the reverse is true. In 2011 alone the governor cut the budget for higher education by 23 per cent.[59] At the per capita level, the figures look even worse: every prisoner costs the state of California $50,000pa; every student just $6,000pa.

Governance problems in California extend to primary and secondary school regulation as well. As Ted Mitchell, CEO and president of New Schools Venture Fund explained when we interviewed him, in California they are seeing financial disinvestment in education at all levels of the system. One of the biggest challenges is regulation on class size. Despite evidence that class size is not a key indicator of student achievement, class size regulations mandate small classes.[60]

55 Emmott 2008: 97
56 Institute for International Education 2012
57 Ozimek and Smith 2012, Hunt and Gauthier-Loiselle 2010: 1
58 Holen 2009: 2
59 Luce 2012b
60 California Department of Education 2012

This law has proved a massive barrier to a system trying to adapt to the new century with innovative approaches to the classroom, including leveraging technology through blended learning.

Adding to the challenge of innovation in the US is the rise of a Luddite, sometimes religiously-based, anti-science attitude in middle America, which affects debates as diverse as those on climate change and Darwinism. If this were to gain further traction, the damage to the US economy could become severe. Meanwhile, growth in the US economy, including California, has been sclerotic since 2008 and commentators there spend much of their time debating when, rather than whether, the US will lose its global leadership position. In the eight years since Charles Krauthammer's claim quoted above, America's image of itself has fallen a long way. Thanks to the concentration and diversity of its talent and expertise, Silicon Valley is thriving still, but it would be complacent to believe success in the future is inevitable, in spite of the relentless determination of its inhabitants to talk it up. Moreover, while US secretary of education Arne Duncan suggested to us that Silicon Valley would continue to thrive, he thought this would be because it draws on a global talent pool and in spite of the tough fiscal situation in California.[61] Meanwhile, the successful start-ups from the Valley, once established, often relocate or outsource jobs because of the prevailing weaknesses of the state.

As Hoffman and Casnocha argue in *The Start-up of You* (2012), the US – and by implication all of us – are in a new world where everyone has to think like an entrepreneur and an innovator. We agree – indeed the future depends on it. They argue:

> 'What's required now is an entrepreneurial mindset. Whether you work for a ten-person company, a giant multinational corporation, a not-for-profit, a government agency, or any type of organisation in between – if you want to seize the new opportunities and meet the challenges of today's fractured career landscapes, you need to think and act like you're running a start-up: your career.'

They add:

> 'The conditions in which entrepreneurs start and grow companies are the conditions we all now live in … You never know what's going to happen next. Information is limited. Resources are tight. Competition is fierce. The world is changing … This means you need to be adapting all the time. And if you fail to adapt, no one – not your employer, not the government – is going to catch you when you fall.'[62]

To sum up, it seems inevitable that the Pacific will replace the Atlantic as the focal point for global leadership, or at least take a growing share. As we have argued, innovation is the key, but all round the Pacific there

61 All quotes from Arne Duncan were made in personal interview with the authors, unless otherwise noted.

62 Hoffman and Casnocha 2012 (Kindle edition): location 206

are barriers to success in innovation. The leaders of the region will need to consider a number of aspects of public policy and economic governance if they are to succeed in making the Pacific the ocean of innovation. No aspect is more central than education, another field in which the Pacific region has shown extraordinary achievement in recent decades, and another field in which bold transformation rather than more of the same is likely to be the key to success. This is the theme addressed in the final section of this paper, but first we need to dive deeper into the sources of innovation.

The sources of innovation

In many people's minds, innovation, invention and great creative achievements are both individual and momentary flashes of inspiration. Eureka moments we call them, recalling Archimedes. If that were how innovation generally occurred, global leaders faced with the challenge of facilitating innovation would no doubt scratch their heads and then perhaps give up. How can you legislate for genius? The good news is that the growing evidence suggests this is not how innovation occurs in spite of the ubiquity of the myth. We have a number of broad strands of evidence to help us understand what circumstances make innovation more likely and what can be done to bring those circumstances about. The first source is history itself and analysis of the places where innovation has occurred and where it has not; the second is the growing scientific and psychological understanding of the creative process.

We begin with history. A combination of luck and judgment in 18th century Britain, followed later by the United States, created the flow of innovation that became the industrial revolution which, in a number of phases, continues to this day. As we saw with the Lunar Men, there was the curiosity associated with a newly scientific way of thinking and the spread to a much wider segment of society of good education; there was an openness to debate both between individuals and publicly; there was the excitement of connecting ideas across subjects and disciplines; there was a willingness to record and subject to scrutiny both successes and failures; there was collaboration and dialogue; and above all there was a determination to connect developments in science to industrial processes so that mass production could meet the growing demands of the newly-enriched middle classes.

More recent analysis builds on these insights to generate the macro-level lessons that emerge from the correspondence of the Lunar Men. Acemoglu and Robinson, in their widely-acclaimed book *Why Nations Fail* (2012), examine the emergence in the Atlantic of the modern economy and reject a number of hypotheses. It wasn't geography, they say, or culture. Look at the two Koreas, they point out – similar geography and culture, totally different economics. Nor was it ignorance in some places and knowledge in others; the knowledge was available to all and there are many examples of leaders who chose destructive policies to enrich

a clique in spite of the knowledge. Instead, they argue, the key has been politics and more especially political institutions. In part as a result of historical accident, Britain and later France and the US developed pluralistic institutions in which no single class or group or elite dominated. The result was the emergence of more inclusive institutions, not just political ones such as the rule of law and representative government, but economic ones such as the market economy and hostility to monopoly.

By contrast, where a closed, powerful elite evolved – such as in Latin America after the conquests of Cortez and Pizzarro – extractive political and economic institutions developed which suited the ruling elite well but had baleful consequences both for the mass of the population and for long-term development. While the authors emphasise that nothing is inevitable – the contingencies of history, such as great leadership or twists of fate can accelerate or interrupt progress at any point – they suggest that the route to prosperity lies through creating inclusive as opposed to extractive institutions, even when this may appear to contradict the short-term interests of the ruling elite.

Niall Ferguson in *Civilization* similarly takes institutions as the starting point for his explanation of what he describes as 500 years of western dominance; 'the differential between the West and the Rest was institutional,' he argues.[63] Competition for trade among European nations such as Britain, France and the Netherlands was also influential. 'Transatlantic trade brought an influx of new nutrients like potatoes and sugar … as well as plentiful cod and herring … Over time the effect was to raise productivity, incomes, nutrition and even height,' he comments.[64] By contrast, Japan, a group of islands of similar size to the British Isles, turned in on itself and fell behind. It had the capacity to grow enough rice to feed its population but no competition for trade, no openness to ideas and no incentive to innovate.

Competition is one of the six explanations Ferguson puts forward to explain the path to Atlantic dominance. The others include science, property rights and the growth of consumerism, all of which were apparent in Jenny Uglow's account of the Lunar Men.

The combination of these institutions or ideas catapulted the west – what we have called the Atlantic – to global dominance, so that on the eve of the first world war, 11 Atlantic countries and their empires were responsible for almost 80 per cent of global economic output. As late as 1990, the average American was over 73 times richer than the average Chinese.[65]

History, therefore, points to inclusive, pluralistic institutions which allow extensive debate of ideas and possible ways forward combined with a consumer society whose demands are met by continuously competing

63 Ferguson 2012: 13–14
64 ibid: 45
65 ibid: 5

and therefore innovative businesses whose property rights are protected in law. The individual, therefore, is simultaneously consumer, worker and citizen. It is apparent that currently some but not all of these conditions are in place in some but not all Pacific Asian countries.

How, though, could the modern study of creativity and innovation inform the deliberations of Pacific leaders in the 21st century? At the level of the individual, modern science tells us that, contrary to the popular myth that, as it were, 'you either have it or you don't', in fact creativity is hardwired into everyone's brain. The challenge in families, schools and workplaces is to unleash this all-too-often untapped potential. As Sir Ken Robinson says, the challenge is to combine people's talent with their passion. Sometimes there will be flashes of insight enabling a breakthrough – these will often occur when routines are broken, when the mind is not focusing on the problem at hand and when, perhaps on a long walk for instance, the mind is able to make connections it would not otherwise have made. At other times, it will be a matter of persistence and slog. As the great mathematician Paul Erdos put it: 'A mathematician is a machine for turning coffee into theorems.'[66] There's often no substitute for hard work.

Creativity, it seems, flourishes when people see (or are enabled to see) not just the individual trees but the forest as well. This connection between big picture and details inspires breakthroughs in every kind of field. Similarly, creativity flourishes neither in complete chaos nor in complete order; it appears to require a combination of the two.

Research also suggests that leaving creativity solely to the individual, however brilliant, is a mistake. Increasingly, scientific and technological breakthroughs are made by teams not individuals. The days of Isaac Newton, who read literally everything there was to read about physics in a year before proceeding to develop his laws of motion, are long gone. Increasingly, scientific papers list multiple authors simply because the breadth and depth of knowledge as well as the size and scope of experiments are simply beyond the compass of a single individual. The more difficult question is how to build teams that are most effectively creative. Everyone knows the tendency in human affairs for leaders to build teams of people with whom they are comfortable; people, in fact, just like themselves. For example, Paul Gompers, Vladimir Mukharlyamov and Yuhai Xuan found that affinity-based collaboration by venture capitalists (based on characteristics such as sharing common backgrounds, schools or previous employers) led to a dramatic reduction in the probability of investment success due to poor decision-making post investment (rather than selection into inferior deals).[67] The evidence suggests that this kills creativity. Similarly, perhaps not surprisingly, a team compiled of conflict and jealousy will fail too.

66 Quoted in Hoffman 1998: 7

67 Gompers et al 2012

The teams that work well get along but are not too comfortable with each other. They challenge and question each other. Dissent is welcomed. Moreover, they are not all experts. Some are outsiders who bring a different, fresh perspective to bear and force the experts in the group to come up and out of the professional rabbit holes they are so fond of diving down. There are many ways to build diversity into a team, but it doesn't happen by accident. The growing emphasis in business organisations on greater equity for women and minorities should pay dividends, although it has only just begun (to take one example, an incredible 95 per cent of venture capitalists are men).

An opportunity to bring diversity to bear that is often missed is to bring young people into positions of leadership. William Pitt was prime minister of Britain at the age of 24. Isambard Kingdom Brunel, the engineer of Britain's greatest 19th century railway, the Great Western, was 30 when he took it on. He in turn appointed Daniel Gooch, age 20, to oversee the development of all the locomotives. In the industrial revolution youth was trusted; we need urgently to trust it again now. After all, no one has a greater incentive to ensure a peaceful and prosperous 21st century than the young; the rest of us will be gone.

This may be why, in the information technology revolution we are currently experiencing, we see once again people in their 20s making some key breakthroughs – Facebook being a prime example. Large organisations, whether government or business, tend to crush young people beneath a mountain of hierarchy rather than liberating them or encouraging them to challenge either the glacial pace of change or the ponderous nature of conventional thinking, whereas in a start-up culture the same individuals flourish. At YCombinator, Silicon Valley's premier start-up incubator and the birthplace of many of today's household names such as AirBnB, DropBox and Reddit, the average age of the entrepreneurs is 26.[68]

Additionally, the world is changing at such a pace that expertise built over a 25-year career is almost obsolete in some fields. In publishing, media and computer coding, the advances of technology have radically transformed industry and enterprise so that traditional ways of doing business are a hindrance rather than an asset. Innovation and creativity require the generation of new ideas, which in turn means not being afraid of failing the first time. Innovators are always learning and growing. Innovators also have to have the self-confidence and will to contradict existing belief and not worry initially whether they will be accepted. They must feel that it is acceptable to not have the right answer all the time and that learning is a process more than a routine. In a new report examining the key success factors of internet start-ups, the Startup Genome found that those entrepreneurs and entrepreneurial teams

68 See http://ycombinator.com/faq.html

that showed a willingness to learn by seeking out mentors and outside advice raised seven times the funding and had 3.5 times more user growth than those who did not.[69]

Innovation need not only happen in resource-rich environments. We've also seen the rise of innovation for, and often by, the world's poorest – newly-dubbed 'Jugaad innovation', *jugaad* being the Urdu and Hindi word for improvisation. Innovation and creativity can happen not just in environments of ample wealth but also in less endowed conditions. In fact, environments where resources are intensely constrained often demand tailored approaches. The idea is that, instead of selling items in small quantities to the wealthy and waiting for everyone else to pass the relevant 'income threshold', products can also be designed to be cheaper and meet the nuances of local needs. For example, simply designing a refrigerator that is smaller and cheaper misses the point that consumers in large parts of the developing world needed cooling for vastly different purposes than the higher-end market.[70] In the low end, they used refrigerators to store perishables from morning to night while the high end needed more intense and constant cooling to store products for days. So when it came to product design, simply stripping down an existing product and making it cheaper was not enough, instead it required complete reinvention. In other cases, Jugaad innovators have turned the disadvantages of the developing world context into an asset – like the bicycle motor which is powered by the jolts the bike receives from potholes. In short, the innovative mindset can succeed as much in the developing world as in the developed.

Overall we see several key conditions for innovation that should inform Pacific countries as they consider policy for the decades ahead. Our innovation model cuts across four levels of civil society: people, teams, organisations and culture.

Innovation requires, first of all, **people with the right skills and attributes**. In the modern world, individuals must be creative, tenacious and passionate, striving for excellence and the pursuit of new ideas. Regurgitation of existing knowledge, the historical focus of education, is no longer sufficient. People will stand out for embracing challenges, working diligently, and persisting in the face of adversity.

Second, these **individuals must be selected and combined into effective teams**. Top teams bring individuals with diverse backgrounds and perspectives together around a shared mission and set of values. The best teams learn to rely on, support and teach one another – creating a culture of learning and supportive feedback that improves the individual and, therefore, the team. They argue and debate in pursuit of a closer understanding of truth. Together, they take responsibility

69 Marmer et al 2011: 5

70 Radjou et al 2012 (Kindle edition): location 310-341

for their mutual success and strive to perform above expectations to improve their organisation. We live this approach in our own team by avoiding the word 'comfortable' and instead embracing restless self-evaluation. We either seize or reject an idea with purpose; never abide it with complacency.

Third, **organisations should be structured to be cross-functional and have fluid organisational roles**. As mentioned above, there should be a balance of chaos and order: enough order and structure to drive to action but enough ambiguity to keep people uninhibited by the past and challenged by questions. Innovative people, teams, and organisations need a constant source of challenging and informed feedback. Just as the Lunar Men in the 18th century would explore and test their ideas with each other, Ray Dalio, the founder and CEO of Bridgewater Associates, the world's most successful hedge fund, subscribes to key principles, the primary one being to 'seek for truth' – or an accurate understanding of reality – because this is necessary for good outcomes. One of Dalio's telling equations is Pain + Reflection = Progress.[71] Many regard his principles as extreme, and in some applications that may be the case, but his fundamental insight has proved itself again and again.

Finally, **society must furnish a culture that is progressive and open to the transmission of new ideas, welcoming of diversity and rules-based**.

Google's entry into China highlights the crucial role that each of these elements plays in innovation. Regularly ranked as one of the world's most innovative companies, Google clearly understands effective people, teams and organisations. In the United States, the company attracts the best people to take on the most challenging engineering problems of our time. Despite this, Google's entry into China has been marked by fits and starts, with the company nearly pulling out altogether in 2010. What is the difference? The Chinese context's closed culture and censorship neutered the company's innovative aims. Google finally agreed to stay in the country, offering censored content, on the basis that 'removing search results is inconsistent with Google's mission, [but] providing no information at all is more inconsistent.'[72] Google's founder and former chairman, Eric Schmidt, emphasised this at the 2012 Aspen Ideas Festival: 'I believe that ultimately censorship fails.' He continues: 'In a long enough time period, do I think this kind of regime approach will end? I think absolutely.'[73] These lessons about creativity come together in the Innovation Framework.

71 Dalio 2011: 23

72 BBC News 2006

73 Quoted in Rogin 2012

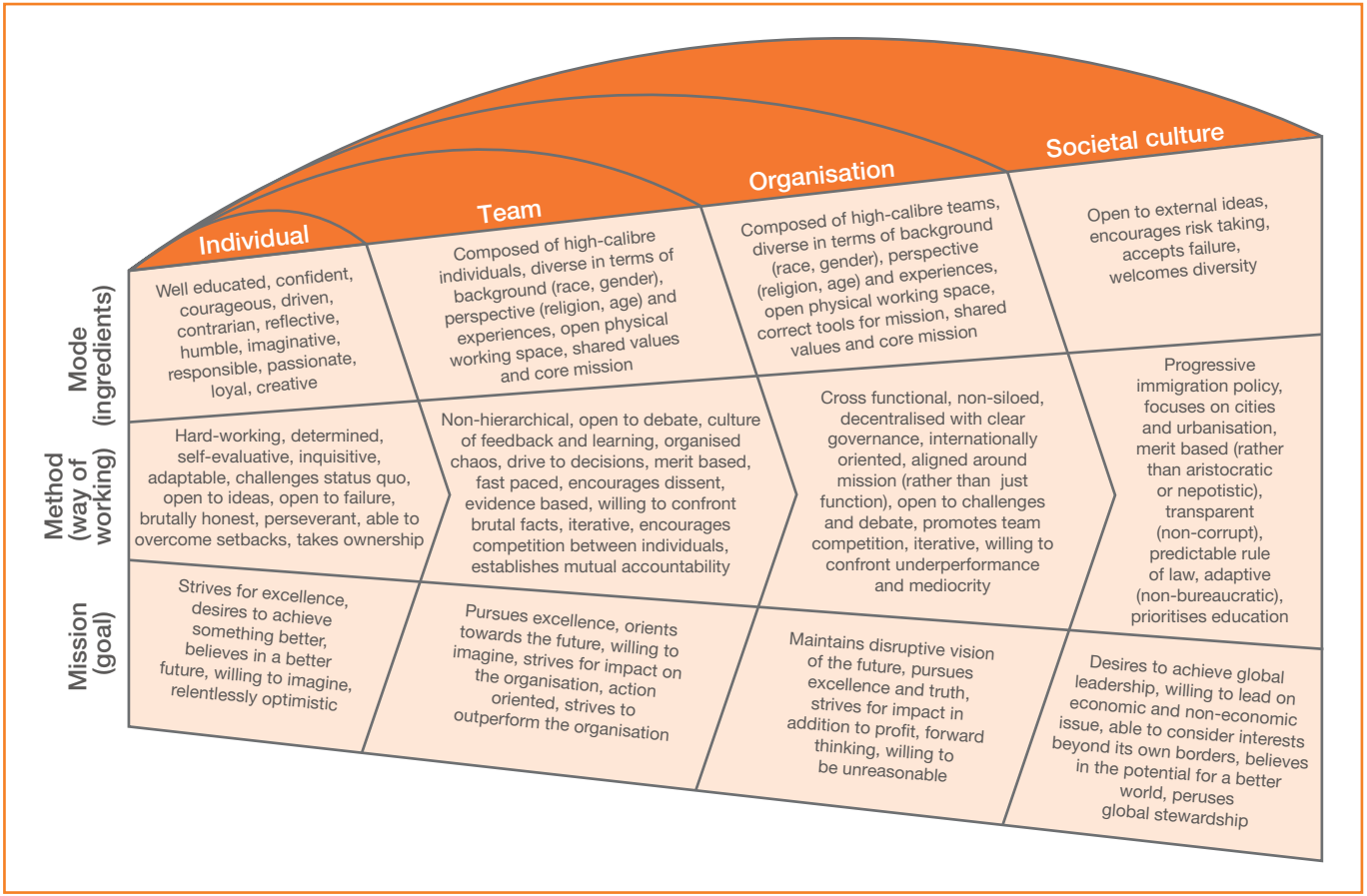


Figure 3: The innovation framework

Writ large, these lessons about creativity and innovation have major implications for public policy. Most significant are the implications for education systems – these are spelled out in the final section of this paper. Here, let it suffice to bring out three other major implications, for research, urban development and societal openness.

Much research is funded by government or its agencies. The emerging trend towards encouraging research at the boundaries of disciplines would seem to be positive. The interaction of researchers from different disciplines has the potential to be highly creative and many advances in knowledge as well as innovations are likely to be at the edge of disciplines. A major tendency of academe in the past 50 years has been increasing specialisation and therefore increasing expertise in ever-narrower fields. Of course this has value, but the breakthroughs may well come when people connect across boundaries or when an individual or team synthesises knowledge and trends from many fields.

Indeed, it is not just across disciplines that connection and synthesis are required; it is also between sectors; between universities and businesses for example; between businesses of different kinds; and between government, NGOs and both universities and businesses. As Julia Gillard told us, countries need not just to increase research funding, but also to incentivise collaboration across boundaries such as that between universities and businesses. Government and other funders of research can incentivise collaboration across discipline and sector boundaries. So too can university leaders: the redesign of Arizona State University around major cross-disciplinary questions is a case in point. Research collaboration across institutional boundaries is also increasingly important.

Research outcomes will need to be produced at a faster pace and often be more iterative than purely post hoc. As research becomes more globally interconnected it will also not be enough to make marginal improvements, though of course these will continue. True breakthroughs and large stepchanges will take precedence and need to be rewarded accordingly.

A second major issue for public policy is the role of the city in generating innovation. We live in the era of the city – it is estimated that by 2025 just 600 urban centres will be generating 65 per cent of the world's GDP.[74] For the first time in human history, more than half of humanity now lives in cities. This change happened in Britain in 1851 and in the US in 1920; now the Pacific Asia region is at the forefront of urbanisation and is likely to continue to lead the way. By 2030, over 60 per cent of China's population will live in cities, and 86 per cent of South Korea's. Even in Vietnam, over 40 per cent of the population will be urbanised

74 Dobbs et al 2012: vi

over the next two decades.[75] 'Today more than half of Chinese live in cities, compared with just 21 per cent in the early 1980s. By 2025, China is forecast to have 219 cities with populations over 1 million (compared to 35 in Europe).'[76] Shanghai alone has constructed the equivalent of 334 Empire State buildings in 14 years.[77]

For creativity and innovation this is potentially a hugely positive trend because cities are undoubtedly more creative, dynamic places than rural areas. As the celebrated academic from Toronto, Richard Florida, puts it, 'cities are cauldrons of creativity'.[78] In addition, the bigger the city, the greater its power to drive innovation. Citing Geoffrey West's work on the subject, Steven Johnson explains that 'the average resident of a metropolis with a population of five million people was almost three times more creative than the average resident of a town of 100,000.'[79] This impressive statistic holds true across several measures: productivity, wages, the number of research institutions, and patents. This is because, in a city, many more serendipitous interactions happen between people. They literally bump into one another and, from these chance interactions, innovations develop. In the big cities, it is always possible to join networks of people in similar or related fields and then connect the networks.

Edward Glaeser from Harvard writes almost poetically on this subject:

> 'Cities, these dense agglomerations that dot the globe, have been engines of innovation since Plato and Aristotle bickered in an Athenian marketplace. The streets of Florence gave us the Renaissance, and the streets of Birmingham gave us the Industrial Revolution. The great prosperity of contemporary London and Bangalore and Tokyo comes from their ability to produce new thinking.'[80]

In his impressive analysis, *Where Good Ideas Come From*, Johnson demonstrates that the vast majority of inventions or discoveries in the past 200 years came from networked people rather than an individual locked away in a room. In some cases, these networks are market networks driven by the incentive of profit. More often, though, they are non-market networks, which are also more likely to develop in large cities. It is not an accident that the coffee house as a place of dialogue coincided with the explosion of innovation in Britain in the 18th century: the coffee house was an urban invention, reinvented for the mass market by Starbucks in the late 20th century.

75 Ferdinand 2012: 104
76 Fenby 2012 (Kindle edition): location 119
77 ibid: location 888
78 Florida 2012 (Kindle edition): location 86
79 Johnson 2010 (Kindle edition): location 183
80 Glaeser 2011 (Kindle edition): location 167

The growth of cities may be remorseless, and largely beyond the control of policymakers (however much they might prefer to think otherwise), but the nature of the cities we create is very much within the realms of public policy. Cities that sprawl across the landscape because suburban land is (or was) cheap, such as Phoenix in Arizona or Houston in Texas, are less creative, innovative places than cities where people are more likely to jostle together and less likely to be isolated in their cars. The combination of universities, centres of the arts, businesses (large and small) and desirable residential streets, as well as shops and coffeehouses all make innovation more likely.

Annalee Saxenian's seminal work *Regional Advantage*, published in 1996, which compared Silicon Valley in California with Route 128 in Massachusetts, explained the success of the former relative to the latter by pointing to decentralised organised forms, non-proprietary standards, horizontal networks and traditions of cooperative exchange. By contrast, secrecy and hierarchy inhibited innovation. In a city such as San Jose with a mass of small companies and a few big ones, chance meetings with like-minded people sparked ideas all the time. By contrast, on Route 128 a small number of large companies guarded their intellectual property jealously and the conversation in the bars turned to baseball and the Red Sox.

A third key theme for public policy is the attitude countries take toward openness both to the world and to their citizens. In Saxenian's later work, *The New Argonauts*, she highlights the vital issue of immigration. Over half of all new companies in Silicon Valley since 1995 have been founded or cofounded by immigrants, and immigrants to the US register patents at twice the rate of non-immigrants.[81] A Canadian friend of ours insists that Toronto is the best place to watch a FIFA World Cup, not because Canada is football-mad (on the contrary, Canada has only ever qualified once), but because Toronto, where 57 per cent of the population was born outside of Canada, has every nationality represented and you can find one bar to watch Brazil, another to watch Croatia, a third to watch Nigeria … or whichever team you want. Saxenian's work illustrates, at least for Silicon Valley, why immigration contributes so much to innovation. She shows that the Indians, Koreans and Chinese people there are not just extremely well-educated and motivated, they are also connected to networks of Indians, Koreans and Chinese around the globe, including in the countries of origin. Economists Jennifer Hunt and Marjolaine Gauthier-Loiselle recently showed that a 1 per cent rise in the proportion of immigrant college graduates in the population increases the number of patents per capita by between 9 per cent and 18 per cent, including 'positive spillovers' into innovation by native-born inventors.[82] The interaction of these global networks, based on diasporas, with the local networks in Silicon

81 Saxenian 2006 (Kindle edition): location 3519

82 Hunt and Gauthier-Loiselle 2010: abstract

Valley generates more and better ideas faster. Dalton McGuinty, premier of Ontario, has recognised this same phenomenon in Toronto and its contribution to making Toronto one of the world's most innovative cities.

Looking again at the patent data, it shows that in 2009 non-residents filed 53 per cent of applications in the US and Canada, compared to 19 per cent in western Europe and 28 per cent in Pacific Asia. US patents filed by non-residents has been around 50 per cent since the 1980s, when Asia was registering non-resident patents in the teens; this shows both how far Asia has come and how far it still has to go.[83]

Jared Diamond in *Guns, Germs and Steel* argues that this openness and interaction across the European nations in close proximity to each other was a major factor in their global dominance. It was this insight, more than anything, that underpinned Deng Xiaoping's analysis of the challenge facing China after the death of Mao:

> 'No country that wishes to become developed today can pursue closed-door policies. We have tasted this bitter experience and our ancestors have tasted it. In the early Ming dynasty in the reign of Yongle when Zheng He sailed the Western Ocean, our country was open. After Yongle died, the dynasty went into decline. China was invaded. … through 300 years of isolation China was made poor, and became backward and mired in ignorance and darkness. No open door is not an option.'[84]

However, in spite of the progress, 30 years later it is clear China still has a substantial distance to travel in the direction of openness. To be sure, the journey to openness, especially to immigration, has subjective social consequences which need to be managed. In cities around the world it is possible to see the varying degrees of success in this venture, but simply closing up is not an option.

Openness is also thriving in the technology sphere. Some of the most innovative new technology companies have built open platforms which allow users to generate their own content and designs. A shortlist of these includes Wikipedia, Twitter and LEGO. Governments are now beginning to capitalise on this trend. For example, Apps for Democracy recently held an innovation contest in Washington, DC, asking developers to make civic-oriented apps using city data and offering a prize of $10,000. The contest yielded 47 apps in 30 days. Useful and quickly-implementable tools were created, such as iLive.at, an application that allowed house-buyers to search neighbourhood data easily. The contest cost $50,000 and lasted a month; the CIO of DC estimated that had these apps been built internally, the cost would have been $2 million and would have taken a year.[85]

83 World Bank Indicators, patent applications by residents and patent applications by non-residents

84 Quoted in Ferguson 2012: 48

85 Johnson 2010 (Kindle edition): location 2356

While there have been significant challenges along the way, the direction in China since Deng's time is clear, and the economic outcome spectacular. Indeed, Pacific Asia in general has evidently moved a long way. However, the question arises: if the Pacific is to provide global leadership, how does the region's capacity to innovate stand up against the criteria set out here? Or to put it differently, how much further must China and other countries in the region travel in the direction of openness?

Crucially, how countries develop their education systems in future, building on undoubted recent achievements, will be a vital aspect of their response to these questions and it is to this theme that we turn in the final part of this paper.

3. LEARNING FOR THE FUTURE: BUILDING THE INNOVATION GENERATION

Global rankings of education systems have become highly influential in the past decade or so, especially since the OECD introduced the Programme for International Student Assessment (PISA) in 2000. National leaders take the competition they generate very seriously. Take US president Barack Obama's words in his 2011 state of the union address: 'We need to out-innovate, out-educate and out-build the rest of the world.'[86] Increasingly, education leaders around the world study the rankings not just to see how their own country comes out, but to learn from other countries. Some of this learning is crude and shallow: 'Finland is top, so we'll be like Finland…' forgetting that education systems are embedded in cultures and some countries (Finland is a good example) are socially highly distinctive. There are not many countries (yet) where everybody's tax return, for example, is published online, as is the case in Finland.

Much of the learning, though, is becoming highly sophisticated, and there is growing dialogue among ministers and top officials about precise and important questions such as: In mathematics, what should all 15-year-olds be expected to know, understand and be able to do? By what processes are future teachers attracted, selected and trained? How can performance at teacher, school and system level be tracked? What information about performance should be made public?

Education for innovation

It is only in the past decade that this learning from global benchmarking has made it possible to found education policy on an ever-growing evidence base. Two reports from McKinsey in the past five years have drawn out the lessons for systems from these comparisons.

The 2007 report, *How the world's best performing school systems come out on top,* highlighted three lessons emerging from an analysis of high-performing school systems: 'The quality of an education system cannot exceed the quality of its teachers; the only way to improve outcomes is to improve instruction; and achieving universally high outcomes is only possible by putting in place mechanisms to ensure that schools deliver high quality instruction to every child.'[87]

86 Quoted in Hanushek et al 2012

87 Barber et al 2007: 43

The 2010 McKinsey report, *How the World's Most Improved School Systems Keep Getting Better*,[88] went a step further and analysed how the top performing school systems continue to improve. The work concluded that a system could become better, no matter what its starting point, given a sustained leadership and a focus on key interventions necessary for systematic improvement.

The international comparisons, and these reports, are of great interest to leaders in Pacific Asia. They also provoke interest elsewhere in the world in how Pacific Asia runs its education systems because, as a region, it does remarkably well.

Table 1
PISA top 20 rankings, 2009

Rank	Country	Overall reading	Overall math	Overall science
1	Shanghai-China	556	600	575
2	Korea	539	546	538
3	Finland	536	541	554
4	Hong Kong	533	555	549
5	Singapore	526	562	542
6	Canada	524	527	529
7	New Zealand	521	519	532
8	Japan	520	529	539
9	Australia	515	514	527
10	Netherlands	508	526	522
11	Belgium	506	515	507
12	Norway	503	498	500
13	Estonia	501	512	528
14	Switzerland	501	534	517
15	Poland	500	495	508
16	Iceland	500	507	496
17	United States	500	487	502
18	Liechtenstein	499	536	520
19	Sweden	497	494	495
20	Germany	497	513	520

Source: OECD, PISA rankings 2009

88 Mourshed et al 2010

Table 2
TIMSS top 20 maths rankings, 2007

Rank	Country	Grade 4 maths	Country	Grade 8 maths
1	Hong Kong	607	Chinese Taipei	598
2	Singapore	599	Rep. of Korea	597
3	Chinese Taipei	576	Singapore	593
4	Japan	568	Hong Kong	572
5	Kazakhstan	549	Japan	570
6	Russian Fed.	544	Hungary	517
7	England	541	England	513
8	Latvia	537	Russian Fed.	512
9	Netherlands	535	United States	508
10	Lithuania	530	Lithuania	506
11	United States	529	Czech Republic	504
12	Germany	525	Slovenia	501
13	Denmark	523	Armenia	499
14	Australia	516	Australia	496
15	Hungary	510	Sweden	491
16	Italy	507	Malta	488
17	Austria	505	Scotland	487
18	Sweden	503	Serbia	486
19	Slovenia	502	Italy	480
20	Armenia	500	Malaysia	474

Source: US Department of Education, Highlights from TIMSS 2007

Table 3
TIMSS top 20 science rankings, 2007

Rank	Country	Grade 4 science	Country	Grade 8 science
1	Singapore	587	Singapore	567
2	Chinese Taipei	557	Chinese Taipei	561
3	Hong Kong	554	Japan	554
4	Japan	548	Rep. of Korea	553
5	Russian Fed.	546	England	542
6	Latvia	542	Hungary	539
7	England	542	Czech Republic	539
8	United States	539	Slovenia	538
9	Hungary	536	Hong Kong	530
10	Italy	535	Russian Fed.	530
11	Kazakhstan	533	United States	520

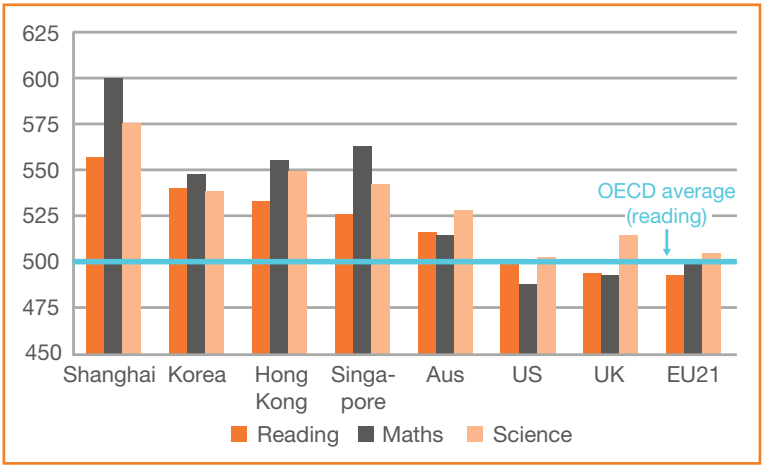
12	Germany	528	Lithuania	519
13	Australia	527	Australia	515
14	Slovak Republic	526	Sweden	511
15	Austria	526	Scotland	496
16	Sweden	525	Italy	495
17	Netherlands	523	Armenia	488
18	Slovenia	518	Norway	487
19	Denmark	517	Ukraine	485
20	Czech Republic	515	Jordan	482

Source: US Department of Education, Highlights from TIMSS 2007

As tables 1–3 show, four of the top 10 systems in both PISA and TIMSS (Trends in International Mathematics and Science Study) are in Pacific Asia– South Korea, Japan, Hong Kong and Singapore. Moreover, in PISA 2009, Shanghai entered as a city and outperformed everyone else, while Chinese Taipei, excluded from PISA for geopolitical reasons, performs excellently in TIMSS. If Australia, New Zealand and Canada, each of which generally does reasonably well in PISA and TIMSS, are added in as Pacific countries, the region could certainly be said to lead the world. (In addition, Chile is the most improved Latin American system in the last two decades.)

In a seminal report prepared by the Australian thinktank the Grattan Institute, *Catching Up: Learning from the best school systems in East Asia*, the authors compared the leading Pacific Asian school systems with Australia, the US, the UK and the European Union. The results are striking.

Figure 4
PISA mean scores for reading, maths and science, 2009



Source: Grattan Institute 2012: 8

	US			UK			EU21			Australia		
	Read	Math.	Sci.	Read	Math.	Sci.	Read	Math.	Sci.	Read	Math.	Sci.
Shanghai	17	**33**	23	19	**32**	19	20	**30**	23	13	**25**	15
Hong Kong	10	20	15	12	18	11	13	17	14	6	12	7
Singapore	8	22	13	10	20	9	10	19	12	3	14	5
Korea	12	17	11	14	16	8	14	14	11	7	9	3

< 1 year behind | 1–2 years behind | > 2 years behind

Source: ibid: 8

Table 4
How many months behind? Differences in PISA performance, 2009

Figure 4 shows that the Pacific Asian systems lead the way compared to Australia, the US, the UK and the EU. Table 4 turns the bar chart into the number of months of schooling that separate the best from the rest. To take just one example, Korean 15-year-old students are 17 months ahead of their US counterparts in mathematics and 14 months ahead of students in the EU. Not only do these systems tend to perform well on average, they also generally demonstrate greater equity than many Atlantic systems, including the UK, the EU and the US. As the chart below (also from the Grattan Institute) shows, Korea, Shanghai and Hong Kong have the smallest distance between highest and lowest performing students. Singapore, with its selective system, is less equitable.

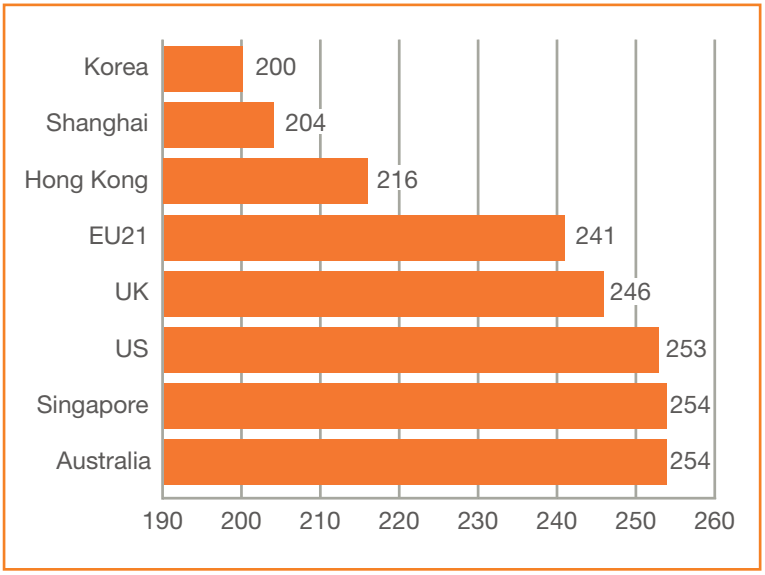


Figure 5
Low and high performing students: the difference between bottom 10 per cent and top 10 per cent in reading, PISA 2009 (PISA points)

Source: ibid: 10

While there are specific characteristics of each of the Pacific Asian systems which contribute to their performance, there are four

explanations, which apply to them all. First, **they all attach high value to the teaching profession**. Indeed, teachers are revered. In Korea, a key part of the strategy over decades has been to attract great people into teaching by paying them excellently – and finding the money to do so by having large classes (compare this with California, as mentioned above). The strategy has worked. The systems ensure that the teachers they attract also develop themselves continuously so that over a career they become better and better. In Shanghai, teachers are required to watch other teachers teach regularly. In Japan, often a small group of teachers will plan a lesson together, watch each other teach it, then refine and improve it collaboratively; the education equivalent of what Toyota does. It is called Lesson Study.

Second, **the quality of the teachers creates a virtuous cycle with families**, which across Pacific Asia are strongly committed to education and have very high expectations of their children. When Hong Kong began offering extended secondary education in the mid-1970s the country achieved near universal enrolment immediately, without much government intervention required.[89] Later, as part of the 'Learning for Life, Learning Through Life' strategy, over 5,000 parents attended workshops run by the education system to teach them how to support their children's reading and learning efforts at home.[90] The Singapore education strategy specifically highlights parent involvement as integral to academic success, saying 'we can only succeed in our mission with the full support and confidence of parents and the community.'[91] This extends to the 'Every School, A Good School' platform, which highlights parents and community partnership as one of four key inputs to develop a good school. Meanwhile, in Shanghai, home-room teachers visit the home of each of their students at least once a year. At home, parents reinforce the progress that their children make in school.

In contrast to Atlantic societies, neither the schools nor the parents in Pacific Asia expect their children to do poorly simply because they are from poor backgrounds. The low expectations that have dogged Atlantic systems – in the US as a result of race, in the UK as a result of class – are absent. Parents of all backgrounds in Pacific Asia take homework seriously and it is not unusual for children to spend three or four hours each evening on homework.

In Korea and Japan many also attend evening 'cramming' schools – the famous *jukos* in Japan – to enhance their chances of getting into the top universities. In South Korea, nine out of 10 elementary school children have private tutoring. In Japan, parents spent $12bn on extra tuition in 2010.[92] In Korea especially, this competition for the elite universities

89 OECD 2010: 100

90 ADB 2012

91 See http://www.moe.gov.sg/about/#basis-for-survival

92 *Times of India*, 4 July 2012, citing an Asian Development Bank event

creates a huge pressure on children, not all of which is healthy, but the two key messages – birth is not destiny and effort is rewarded – are vital underpinnings of successful education systems. As the Chinese put it crudely: 'Diligence can compensate for stupidity.'[93] By contrast, the opposite beliefs – birth is destiny and either you are 'intelligent' or not – create huge psychological barriers to universal success and are widely held in the Atlantic societies.

This leads to the third explanation for excellent performance in Pacific Asia: **these are societies and cultures which place a high value on education**. Instead of believing the talent myth, which dominates Atlantic perspectives on education (think how often you hear an American sum someone up by saying they are 'smart', or the opposite), they value learning and the learning process, and expect that those who work at something will, over time, be able to master it. In China, with literally thousands of years of entry to the civil service through competitive examination, this belief that a poor person from a far-flung corner of the empire, through a combination of talent and hard work can make it into the elite, is deeply embedded in the culture and a common theme in popular films. As Bill Emmott points out, Japanese civil servants have traditionally been selected through a similar process.[94]

The fourth and final explanation is that, in contrast to the Atlantic systems which are beset by political controversy, conflict and ever-changing education strategies, **Pacific Asian systems have often had long-term technocratic and strategic approaches to improving their education systems**, with excellent civil servants in the lead. Take for example the well-known three-phase strategy in Singapore since 1965. Singapore deliberately linked the nation's education policy with their macroeconomic strategy – moving from 'survival economics, survival-driven education' to 'sustainable development through efficiency-driven education, 1978–1997' to today's 'knowledge based economy through ability-driven education'. The first phase emphasised rapid expansion of education (building schools, hiring teachers and achieving universal primary enrolment), while the second phase focused on efficiency reforms and standardisation (national curriculum, regular student assessment). Today, Singapore is pursuing the 'Thinking Schools, Learning Nation' strategy to engineer an individualised, responsive education system.[95] This more flexible system relies on the foundation of high expectations and universal standards established in the preceding decades.

Less well-known but also impressive is the Hong Kong curriculum and examinations reform, 'Learning for Life, Learning Through Life', which the system embarked upon soon after the 1997 handover and which will only be fully implemented when the first cohort finishes undergraduate

93 OECD 2010: 85

94 Emmott 2008: 89

95 Goh et al 2008: 12–34

study in 2016. To Michael (Barber), looking at this approach to reform back in the year 2000, it seemed painfully slow, but as a means of taking a high-performing system and making it better still, it has proved to be exemplary. The Grattan Institute report rightly cites it as a model. From the start, the education ministry focused concurrently on strategy and detailed planning for implementation, ensuring that execution was well sequenced and linked to the overarching goal of improving teaching and learning. The system then implemented the strategy with focus and fidelity. Indeed The Grattan Institute suggests this is one of the longest lived education strategy documents. The necessary change is now happening in every classroom, and affecting every teacher and student in Hong Kong rather than remaining simply as words in a policy document, as so often happens with reform in other countries. The result is that Hong Kong moved from 17th out of 35 countries in the 2001 Program of International Reading Literacy (PIRLS) to second in 2006. In short, the model of the developmental state debated earlier in this paper has generally been successful in the education sphere as well as in the economy.[96]

Admittedly, not all of Pacific Asia has made such remarkable progress. North Korea and Burma have made no attempt, but there are signs that Malaysia, Indonesia and Vietnam are moving in the right direction from varying distances behind the region's leading systems. In any case, the overall story is impressive and a major contributor to the region's economic progress in recent decades. Indeed, a 2012 OECD article, *Knowledge and skills are Infinite – Oil is not*, by Andreas Schleicher, the guiding spirit of the OECD's education work, suggests that nations which had wealth in natural resources, such as oil or valuable minerals, invested generally in consumption and not in education systems to build the skills and knowledge of their citizens. By contrast, those who invested for long-term skills have reaped tremendous benefits in economic and social welfare.

While the PISA scores of many Pacific Asian countries are impressive, PISA does not claim to measure all types of learning. Professor Yong Zhao put countries' rankings on PISA mathematics scores together with their perceived entrepreneurial capacity, and found a striking negative correlation.[97] Many of the countries that performed best on PISA had the lowest ranking on entrepreneurship. Importantly for Pacific Asia, students from Singapore, Korea, Taiwan and Japan are among the best performers on PISA but score the lowest in confidence in their ability to start a new business. This reinforces our argument that, in spite of their undoubted success in education over the past half century, Pacific Asian countries cannot rely on more of the same if there are to meet the challenges of the 21st century.

96 Jensen et al 2012: 24–46

97 See http://zhaolearning.com/2012/06/06/test-scores-vs-entrepreneurship-pisa-timss-and-confidence/

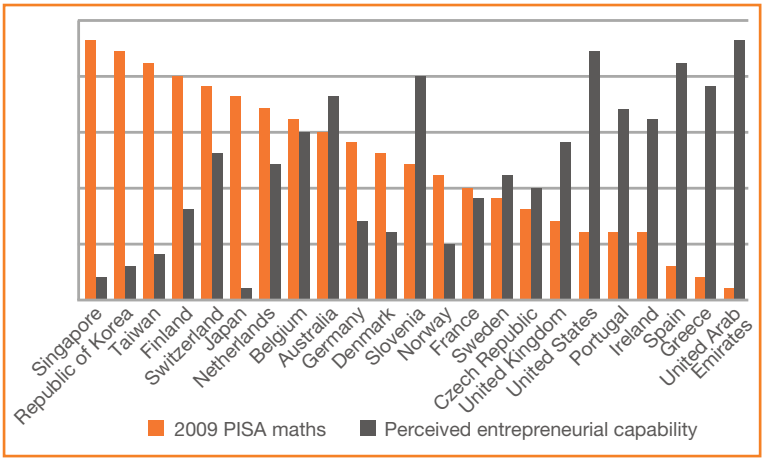


Figure 6
Ranking by PISA maths score and perceived entrepreneurial capability

Source: Zhao 2012

Zhao's case is reinforced by correlating performance in mathematics with confidence in mathematical abilities. Tom Loveless, in his book *How Well Are American Students Learning?,* observes that there is a negative correlation between students' confidence in their mathematical abilities and their maths scores on the TIMSS, and an even stronger negative correlation showing that the less their enjoyment of maths, the higher their maths scores.[98] Of course, complicated maths is genuinely difficult, which might explain this point in part. Top athletes, for example, often describe the pain and drudgery involved in the endless practice and training and the same realisation may dawn on the best mathematicians.

One therefore has to interpret this data with care. As Ben Jensen explained to us, 15-year-olds who were low performers in PISA were much more optimistic that climate change will be effectively dealt with than their high-performing peers. Similarly, low performers might be falsely optimistic about becoming an entrepreneur. Even so, the data gives, at the very least, pause for thought.

* * *

Given their success and the deeply rooted nature of educational progress in the region, it would be tempting for leaders to conclude that they should leave their education systems well alone. The region could rest on its educational laurels while the rest of the world scrambles to catch up. The central argument of this paper is that this would be a profound mistake. If the Pacific is to assume global leadership, it needs to lead the world in innovation and, if it is to do that, its education systems will need to adapt from their stunning success in what might be thought of as the 20th century paradigm and take the lead in developing

98 Quoted in Yong Zhao 2012

a new, 21st century paradigm. The late 20th century prioritisation of human capital in Pacific Asia provides a foundation to be sure, but in order to build on it dramatic change will be required. Meanwhile, California will need to break out of its self-imposed gridlock. From our conversations with leaders of these systems, we know that they are already thinking along these lines. The extent of the shift required is huge, and bringing it about will be a major challenge. The Singapore and Hong Kong curriculum and examinations reform mentioned above might be considered a major step in the right direction, while the best charter systems in California and the bold reform in Los Angeles, led by John Deasy, indicate the way forward there. The rest of this paper sketches out what features the education systems require to enable successful global leadership and innovation in the decades ahead.

What children should learn

The road to hell in education is paved with false dichotomies. One of the more devastating of these, because it is so thoroughly misleading, is the belief that systems which ensure high standards in reading, writing and arithmetic inevitably do so at the expense of creativity, thinking, individuality and so on. Especially in Atlantic societies, this is put forward, often by teachers themselves, as an explanation for the poor performance of, say, the UK or US compared to Pacific Asia. It seems plausible at first sight, but it is completely untrue. For one thing, it would not explain why the UK or the US performs worse than Canadian provinces such as Ontario or Alberta. For another, the very idea that being highly literate reduces creativity is patently absurd. Moreover, the evidence at the school level suggests that, generally speaking, the schools which do well in the basics also do well in providing a broad, rich curriculum. In our interview with Tony Blair, he strongly reinforced this point: yes, the Pacific Asian education systems should promote creativity and innovation, but by building on, rather than weakening, their enviable record in the basics. Julia Gillard made the same point: 'It's not an either/or… literacy and numeracy go together with creativity and innovation.'

Nevertheless, being good at securing high standards in reading, writing and arithmetic alone doesn't guarantee high performance across a broad, rich curriculum, especially if children spend much of their evenings on the basics and the culture promotes deference and order rather than questions and chaos. The central challenge for Pacific Asia, therefore, will be to grasp a broader, wider and deeper curriculum, not by overthrowing the education model they have developed in recent decades, but by building on it. Across the region – Michael (Barber) has been involved in conversations at the highest level on this theme in Hong Kong, Singapore and Japan within the past year or so, for example – this is precisely the direction in which policy is headed, but no one, least of all the leaders of Pacific Asian systems, underestimates how difficult it will be to achieve the necessary shift.

To clarify a debate about the curriculum, which has a tendency to spiral into jargon, we have attempted to summarise what children should learn in a simple mathematical equation:[99]

Well-educated = E(K+T+L)

The K stands for knowledge – knowledge meaning 'Know How' (skills) as well as 'Know What'. There is significant knowledge we want children to learn in school. Clearly how to read and write and do basic mathematics; clearly an outline of the history of the country where they live in the context of global history; and clearly too an introduction to science, without which modern life cannot be understood. In addition, they need to learn skills such as those related to information technology, taking notes or making a succinct summary. To illustrate, we want children not just to know Pythagoras's theorem in the sense of being able to describe it; we want them to know when and how to use it to solve problems they might come across in the real world.

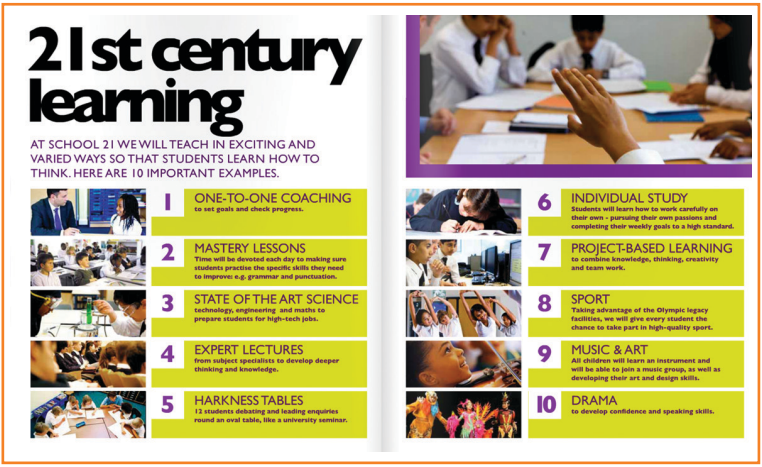
The T stands for thinking or thought. Educationists have a tendency to add the world 'skills' to something in the belief that it creates a new discipline, and the idea of 'thinking skills' was therefore, understandably, widely derided, especially by traditionalists. But teaching children to think has surely been a profound and underlying goal of education at least as far back as Plato. Moreover, the evidence shows overwhelmingly that when children are taught to think, and to reflect on how they are thinking as they learn their subjects, their performance significantly improves.

The implication of this argument is therefore not that there should be some separate set of classes in 'thinking skills', but that subject teachers should be able to teach different approaches to thinking through their subjects. A glance at the workplace, not to mention the public sphere, demonstrates powerfully just how important it is to master different ways of thinking. Sometimes the demand is for a three-minute synthesis of an argument or issue – the famous 'elevator pitch'; other times it is for a long reflection on all sides of an issue. Sometimes we need to think in teams, other times alone. Sometimes we need to be cool and logical with deductive thinking; other times we need to be warm and bold – inductive thinking. Sometimes we need to prioritise and focus; other times we need to create and imagine. Building into the curriculum activities once thought 'extracurricular', such as competitive debate, is one example of teaching critical thinking and the capacity to make a case. The psychological literature has moved on dramatically in the past 25 years; it is now conclusive that capacities we once thought were innate and fixed are in fact learnable and can be developed. If, in the next generation, the

99 Barber 2009: 12

Pacific region is to lead humanity through the challenges of the first half of the 21st century, then its students need to learn how to think well – in a range of ways – as well as how to acquire knowledge.

Several schools are already adapting to focus on different types of thinking. A notable example is School21 based in the east of London, near the 2012 Olympic Park and due to open in September 2012.[100] School21, a privately run, state-funded school, founded by Peter Hyman, a former speechwriter for Tony Blair, has an engineered curriculum with particular emphasis on learning how to learn and developing thinking and questioning skills.



Source: http://www.tes.co.uk/Upload/Attachments/TES/3034332/School%2021%20Secondary%20Prospectus.pdf

In recent policy documents in the Pacific region, as well as elsewhere, this theme is increasingly prioritised, but effective and universal implementation has so far proved elusive.

The L stands for leadership – leadership in the sense of being able to influence those around you in the family, community, workplace or classroom. In this sense, leadership really is, or should be, for everybody. The challenge for a school or school system is to teach this quality which encompasses much of what sometimes goes under the heading of '21st century skills' – the ability to communicate, work collaboratively in teams, stand up for a point of view, see another's point of view and make decisions. The answer is to provide, during the course of a school week, many different opportunities in which different children can seize the opportunities to lead – sport, drama, music or expeditions, for example – in addition to the leadership opportunities available in ordinary classes.

100 See http://www.school21.org/

Similarly, schools can break the routine timetable periodically to enable the students to work in teams – perhaps multiple-age teams – on interdisciplinary questions such as 'Cracking the Genome: Curse or Blessing?' (a theme used by a school we came across some time ago in conversation with Peter Hill, former chief executive of the Australian Curriculum Assessment and Reporting Authority), which would reinforce the teaching of thinking as well as provide leadership opportunities. More mundanely, but equally importantly, schools should keep records of students' progress not just in the subjects, as they do routinely, but also in the development of these other, broader qualities. School systems need to make sure that these qualities are indeed being developed for every student. This approach will become important as criteria for admissions to institutes of higher learning and employment increasingly require not just academic success but output and achievement across a broad range of accomplishments. Traditional tests will not be adequate for the task; educators will need to develop more sophisticated approaches to assessment assisted by technology.

This leads to the E in the calculation, which stands for ethics. Again, ethics cannot generally be taught as a separate subject. It needs to be learned from the way the school operates, the way the teachers and students interact, and the way the school interacts with the communities it serves. Hence the E in the equation being outside the bracket. As traditional institutions, such as the family or church, break down, increasingly schools are the only social institutions we can rely on to inculcate in young people the values or ethical underpinning on which our collective future depends. Of course, cultures vary and the origins of ethics vary too, some rooted in religious belief, others not, but there are nevertheless some values that are universal and vital: respecting opinions different from one's own; respecting individuals equally regardless of their wealth, race, gender, sexual orientation or origin; recognising the diversity of life – not just human life – on Earth and understanding the threats to environmental sustainability; and accepting that a society is more likely to be successful if the rule of law is in place than if each person or family takes the law into their own hands. As Martin Wolf observed on the prospects for Pacific Asian global leadership, 'children there need to emerge from school with a view of being part of global society, and getting Asian children to think globally will be difficult.'

Ethics and leadership require a considerable amount of self-understanding and challenge as well as content. One programme which illustrates this for high school students is Global Citizen Year, based in California: a gap-year programme which places US high school graduates with a host family and social internship in a developing country.[101] The students take leadership classes, attend lectures

101 See http://globalcitizenyear.org

from experts and engage in seminars both before they leave for their host country and during their time abroad. This experiential learning challenges students by showing them a different global reality, and helps them pick up insights about both the broader context and themselves. Similarly, the One World Youth Project has aspirations with a lower-cost model – they connect classrooms and students through video around the globe to exchange ideas and dialogue. This has brought measurable growth in empathy and global competence among the students who completed the year-long curriculum.[102] Meanwhile, Tony Blair's Faith Foundation is seeking to generate this kind of dialogue among school students from different faith backgrounds. There is huge room for growth in these kinds of development; the biggest barrier in Pacific Asia may be the societal and parental obsession with exams for university entrance. Overall, international exposure and being forced to confront different experiences builds creativity and flexibility, both valuable attributes for leadership and understanding.

The population explosion of the past 70 years, the rise of cities, especially megacities – many with extremely diverse populations thanks to the extraordinary and growing patterns of migration in the past half century – all demand that a shared ethical basis crosses the boundaries of culture and nationality. There is an obvious danger in the idea of individual governments imposing ethics, which means that generally this task will be left to the schools and teachers themselves.

This, then, is E(K+T+L). The contention here is not just that a curriculum of this kind would better prepare students for the 21st century lives they will lead; it is also that the explicit combination of knowledge plus thinking plus leadership underpinned by ethics is the combination most likely to unleash in young people the qualities which will enable them to be innovative in their work and life and constructive in their engagement with communities at every level from the local to the global.

Finally, it should be pointed out that E(K+T+L) is a broad framework which leaves extensive room for each country or jurisdiction to shape its own curriculum. It is not a straitjacket – it is a platform.

While there are examples of individual schools taking strides in this direction, such progress is rare at country level. Nevertheless, it is possible to see advances in some Pacific Asian countries. In Shanghai, for example, recent curriculum reform includes:

> 'the *basic curriculum*, to be experienced by all students … the *enriched curriculum*, which aims to develop students' potential … and the *inquiry-based curriculum*, which is implemented mainly through extra-curricular activities.'

102 See http://oneworldyouthproject.org

The declared intention of the authorities is to encourage independent learning and to unlock creativity and critical thinking. As Wen Jiabao, the Chinese premier, said in August 2010: 'We must encourage students to think independently, freely express themselves, get them to believe in themselves, protect and stimulate their imagination and creativity.'[103] It remains to be seen how far this will go in practice.

Meanwhile, as long ago as 1998, Singapore published its vision of the future, entitled 'Thinking Schools, Learning Nation', which was later built on with 'Teach Less, Learn More' and the encouragement of greater curriculum experimentation at school level.

At a recent seminar at the OECD (June 2012), on *What Students Should Learn in the 21st Century*, it was noticeable that Pacific Asian countries were predominant, with Singapore, Korea, Japan and Australia all represented in a discussion of precisely the themes identified above.

A high floor, no ceiling

Thinking of the curriculum as a platform is a vital step because, in the 21st century, the goal of school systems is different from that in the 20th century. Then the goal of a school system was to sort children out – the minority who would go to university, fill the professions and go on to lead the country, from the rest who would work in manual, skilled, semi-skilled or unskilled jobs. With that goal, a school system needed to provide high academic standards only for a few, while the rest needed the basics. Much of the trauma surrounding contemporary education reform has its roots in the need to abandon this outdated model.

The 21st century, by contrast, demands that everyone achieves high standards in each of E, K, T and L. Not all will go to university, but all need a standard of education that will enable them to adapt and change as they respond to the constant dramatic shifts in the global labour market. As American reformers put it, every student needs to be ready for college, work and citizenship. The authors of *The Start-up of You* put it this way: 'Your competitive advantage is formed by the interplay of three different, ever-changing forces: your assets, your aspirations/values, and the market realities.'[104] If each of us is to think of our careers in these terms, each of us needs E(K+T+L), including the confidence to keep adapting and learning throughout life. Moreover, we know from the OECD and other organisations how dramatically the labour market is changing. Unskilled work is increasingly automated. Even skilled work that can be made routine is becoming automated. In *That Used to be Us*, Tom Friedman and Michael Mandelbaum quote Mark Rosenberg of Florida International University: 'It is imperative that we become much better in educating students not just to *take* good jobs but to *create* good jobs.'

103 Blanchard 2010

104 Hoffman and Casnocha 2012 (Kindle edition): location 474

They add:

> '…we are convinced the world increasingly will be divided between high-imagination-developing countries, which encourage and enable the imagination and extras of their people, and low-imagination-enabling countries, which suppress or simply fail to develop their people's creative capacities and abilities to spark new ideas, start up new industries and nurture their own "extra".'[105]

Interestingly, this analysis of the modern economy coincides almost totally with Vaclav Havel's comments on political pluralism and innovation a generation earlier. Writing from a prison cell in 1975, Havel argued:

> 'For we never know when some inconspicuous spark of knowledge may suddenly light up the road for the whole of society, without society ever perhaps realising how it came to see the road. Even those other innumerable flashes of knowledge which never illuminate the path ahead … fulfil a certain range of society's potentialities – either its creative powers or simply its liberties.'[106]

The imperative this perspective brings is clear: you can't tell where the great ideas are going to come from, so it is essential to unlock the talents of everyone. To do otherwise is to continue to waste talent on a colossal scale. Hence, for example, Julia Gillard's emphasis on equity, including for Australia's indigenous people. The connection between innovation and economic growth on the one hand and creativity and political liberty on the other is becoming ever stronger as a result of technological and social change. This is a central message for those, in the Pacific region (or elsewhere for that matter), who aspire to global leadership in the 21st century.

In short, education systems today need to get everyone onto a platform of high minimum standards. To put it differently, they must place a high floor under every student's feet. Some Pacific Asian societies have, along with some Canadian provinces and northern Europe, in fact been more successful than most in the world at providing a high floor for (almost) everyone. However, this floor is largely a 'K' floor with a little 'T'. The 'L' and the 'E' remain at best untested and unrecorded, at worst absent.

Moreover, even if the high floor were fully in place, it would not be enough. It is also important to make sure that there is no ceiling and that students who have passion, aspiration or talent in whatever field of endeavour – musical, artistic or sporting, for example, as well as academic – have the opportunity to fly. The growing literature on talent

105 Friedman and Mandelbaum 2011: 138
106 Quoted in Barber 1997

demonstrates convincingly that success is a matter of hard work, persistence and good coaching (10,000 hours of deliberate practice being the key to reaching high levels of performance) rather than some special gift.[107] If children are never encouraged to pursue music, drama or various sports, their potential to succeed is lost – not just to them, but to all of us. This is another colossal waste of talent. Educators love to talk about 'meeting children's needs', but meeting needs is not enough. It is also necessary to unlock aspiration and unleash energy and potential.

On this measure, Pacific Asian countries have some advantage over others because they have a strong cultural belief in hard work and effort and are less taken in by the talent myth. However, they are less good at making the wider, non-academic opportunities available than they need to be – not least because students spend so long each day and each year studying. A recent report even suggests that students' eyesight in some Asian countries is suffering because they spend too much time studying and not enough out-of-doors.[108]

Thinking through the relationship between equity and diversity might help to explain the way forward. This framework has been at the heart of Michael (Barber's) thinking for a decade or more and is, in our view, more relevant than ever. After all, every society seeks a more equitable education system – with a high floor beneath everyone's feet – but must do so in a context of growing diversity. The central question for every policymaker, therefore, is how to combine equity with diversity.

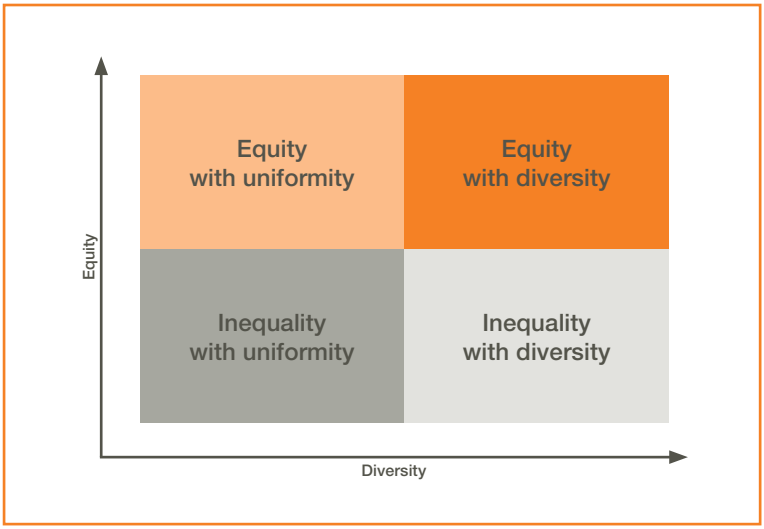


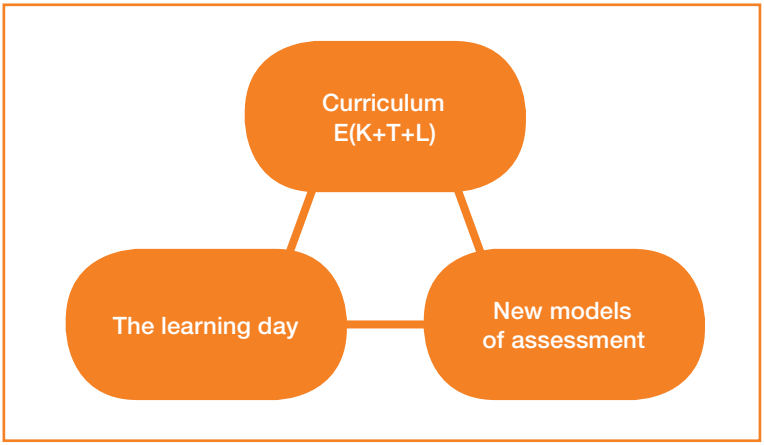
Figure 7
A framework for a more equitable education system

107 Syed 2010 (Kindle edition): location 978ff
108 Morgan et al 2012

Generalising ruthlessly to make a point, the high-performing Pacific Asian systems tend to find themselves in the top left-hand box, while many Atlantic systems are in the bottom right-hand box. Both need to shift towards the top right (and avoid the bottom left). To do this, Pacific Asia's systems need to value individual aspiration and difference more highly, while Atlantic systems need to emphasise the high floor and destroy the talent myth.

As this unfolds, not only will the content of the curriculum have to change, but also the organisation of the learning day and, above all, the way in which students are assessed.

Figure 8
The student perspective



There is growing evidence that technology can and does influence outcomes for the better, not when it replaces the teacher, but when – alongside an active, motivating teacher ('teacher as activator' as John Hattie describes it[109]) – it reinforces, extends and deepens students' learning opportunities. In addition, it brings the opportunity to think radically about the learning day by connecting organically what students learn in school and at home and also ensuring parents are better informed and more able to assist. Among the most promising experiments in education today are the developments in hybrid schooling, which combines great teaching, great technology and much more independent learning. However, it is important to note that technology alone and not integrated into the learning day rarely results in improved learning. In fact, recent studies in Peru and Thailand have shown the failure of 'one child, one laptop' policies to make any impact on learning. It is critical that technology incorporates best practice pedagogy and is integrated systematically into the learning day.[110] Michael Fullan, in *Stratosphere*, published in June 2012, argues that

109 Hattie 2011
110 Economist 2012

technology can transform performance but only if it is integrated with deep understanding of what makes good teaching and knowledge of how to reform education systems.

Furthermore, equity and diversity implies a more radical rethink of the way time is used in school. Some schools are already seizing these opportunities. For example, as argued above, schools can collapse the routine timetable altogether for two or three days every month or so, in order to break the students into teams and give them a cross-disciplinary task – such as 'How could we improve transport in our city within three years?' – to work on and then present to an audience after three days. These are the type of real-world challenges and working styles that students will be asked to face after graduation after all, so it should be natural to incorporate schoolwork that anticipates future expectations. In these circumstances, the teachers become enablers, activators, connectors, facilitators, mentors and challengers as well as sources of expertise.

Equally, instead of each day consisting of a march through six or seven 45-minute or hour-long lessons, the day can be organised differently too, with students experiencing not just standard lessons but also self-directed study time, small group work and one-to-one tutorials. Advanced technology offers incredible power for individualised learning that has not yet been fully used by any large school system. This way, students who have fallen behind can find the extra support necessary to get onto the high floor; others can seize opportunities to pursue their aspirations.

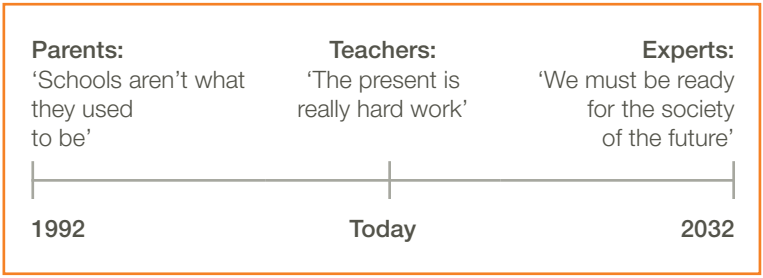
Schools need to prepare students at the earliest ages not just to be employees filling ranks and completing defined tasks but to be dynamic leaders who can create jobs, innovate new processes and be self-directed. The communitarian aspects of Pacific Asian systems will remain important for equipping students to become innovative in a collective setting; the question is whether they can also cultivate the creativity and diversity needed for more disruptive innovation, especially as that generally occurs outside of large institutional settings. Without this preparation and mindset, students will find themselves adrift in the emerging global economy.

The implications for the assessment of all this are obvious. We need new forms of assessment that test or evaluate not just K but also T and L and even perhaps E. The intention of OECD-PISA to test collaborative problem-solving in 2015 is one indication of future direction. Meanwhile, as the technology moves on, new forms of assessment – just-in-time and using simulations, for example – are becoming both possible and affordable. The sophistication of computer games may be the best indication of what the future holds.[111]

111 Ritterfield et al 2009

For Pacific Asian countries, these developments to the curriculum together with organisational and assessment changes hold huge promise for achieving the progress needed for the 21st century, but it will not be easy to make the necessary changes. Teachers steeped in the traditions of the current way of doing things – particularly in places such as South Korea or Japan where they are evidently successful – will find it difficult to change or even see why they should. Meanwhile, parents too will be highly sceptical given the cultural status of particular exams, such as those in Seoul and Tokyo that govern access to top universities. As the Chinese put it, public examinations are the baton that conducts the entire orchestra; in short, unless these change, nothing else will change.[112] The public debate in Hong Kong over the past decade about the radical redesign of curriculum and assessment is evidence of how difficult this might be elsewhere. The challenge is that while education reformers are seeking to design a system for 20 years ahead, teachers struggle with the present and parents remember the system of 20 years ago: the conceptual gap is therefore 40 years – a major communications challenge which governments and educators often underestimate. You could argue that the gap is even bigger than this, given that school students of today will still be part of the global workforce 50 years from now.

Figure 9
The 40-year communication gap



A whole-system revolution

As a result of international benchmarking, there is growing knowledge of how to reform education systems successfully. This knowledge about reforming whole systems (as opposed to introducing superficially attractive 'initiatives') has huge potential. Systems in the Pacific region as varied as Japan, Hong Kong, Singapore and Chile are actively applying this knowledge and making progress as a result. At the school level, this knowledge is set out in three major reports, McKinsey's 2007 *How the world's best performing school systems come out on top,* McKinsey's 2010 *How the world's best school systems keep getting better* and Marc Tucker's 2011 book *Surpassing Shanghai, An Agenda for American Education Built on the World's Leading Systems*, and can perhaps best be summarised in table 5.

112 OECD 2012: 92

Standards and accountability	Human capital	Structure and organisation
Globally benchmarked standards	Recruit great people and train them well	Effective, enabling central department and agencies
Good, transparent data and accountability	Continuous improvement of pedagogical skills and knowledge	Capacity to manage change and engage communities at every level
Every child on the agenda always, in order to challenge inequality	Great leadership at school level	Operational responsibility and budgets significantly devolved to school level

Table 5
The building blocks of world-class education systems: what we already know

The fundamental message of table 5 is: set high standards; monitor whether they are being achieved; provide excellent teachers who improve their teaching throughout their careers; ensure well-trained, well-selected principals or headteachers; and then reorganise the system's structure so that it becomes a dynamic driver of change rather than a static bureaucracy – a driver of quality rather than an enforcer of compliance. John Hattie has probably done more than anyone else to summarise and make practical the evidence on each of these elements.[113] His most recent book *Visible Learning for Teachers* is a masterly synthesis. To take just one element of this framework – teachers – and spell out Hattie's conclusion is to show how far we still have to go. He argues that expert or 'high-value' teachers are significantly different from their more ordinary peers in their ability to perform each of seven 'Cs':

1. Care
2. Control
3. Clarify
4. Challenge
5. Captivate
6. Confer
7. Consolidate

Helpfully, the students themselves are the most able to notice these differences when they occur, a point reinforced by the recent work in the US by Tom Kane.[114] Put simply, if all teachers matched the best

113 Hattie 2011

114 Thomas Kane speaking in January 2012 at the Askwith Forums, see http://www.gse.harvard.edu/news-impact/2012/01/live-stream-and-online-chat-tom-kane-askwith-forum/

teachers, or even approached their level, performance would rise dramatically around the world.

Though the knowledge is now well established, most systems have still not applied it, partly because bringing change across a large system requires consistent and courageous leadership, and partly because implementation is all-too-often not taken seriously enough. In Russia, for example, bold reforms are being contemplated in 2012, but no one yet is expecting successful implementation or even planning for it systematically. Ensuring the state itself is effective is therefore a key part of making progress. In the Pacific Asia region, building on the successes of the development state in the late 20th century in the more transparent, impatient and democratic 21st century will be a challenge. As Tony Blair says: 'Politics today is more about effective delivery than ideology.'

Increasingly, a science or quasi-science of effective delivery in government is emerging. A number of countries around the world have adapted and refined the approach developed by the Prime Minister's Delivery Unit (PMDU) in the Blair administration and demonstrated real progress – Malaysia, Ontario in Canada and the California state university system are just a few examples in APEC countries. In the US, the Education Delivery Institute is supporting more than a dozen state education systems in the adoption of this proven approach.[115]

Meanwhile, Hong Kong's approach to delivery of education reform – very well described in the recent Grattan Institute report referenced earlier – is rather different, but undoubtedly successful. The government took a long-term, strategic view and ensured that 'each element of the system [acted] as an implementation tool to reinforce reforms.'[116] Because the design was coherent and deeply considered, this worked. Moreover, implementation was carefully sequenced and implemented incrementally while those at the centre of the system ensured coordination and monitored implementation carefully, refining it where necessary.

In fact, the Hong Kong and PMDU approaches have underlying similarities, the most important of which are being clear about priorities and ensuring a constant supply of data and feedback from the system so that implementation can be adjusted or refined as plans are implemented. Doing this involves building disciplined routines at the heart of government so that system leaders don't end up spending all their time managing crises.

However, even if systems applied all of this existing knowledge effectively, while it would be a great advance, it would not be enough to meet the challenge of the 21st century; collectively we don't know yet

115 See: www.deliveryinstitute.org

116 Jensen 2012: 32

how to achieve E(K+T+L) for every student. For this reason, systems also need to become more adept at generating, identifying and scaling innovation internally. At present, many systems lack the capacity to innovate and some public systems where there is an effective monopoly actively crush it. It is not unusual for people at school level, perhaps especially in Pacific Asia, to do only what they are expected to – often well – and only change if the top of the bureaucracy issues instructions to do so. In Singapore, the government is trying to change this because it is aware of the need to develop innovative capacity, but it is a slow process because the culture of the system is deeply ingrained and because, as we have seen, societal expectations are conservative too.

In this aspect, Pacific Asian systems have much to learn from some Atlantic systems, especially perhaps Sweden, England and parts of the US. As Arne Duncan, US secretary of education explains, 'the US is still ahead in experimentation … our decentralised system has its pros and cons, but one of the biggest pros is that it can generate great ideas. We have many islands of excellence.' However, he went on to express frustration that even the US was not moving fast enough in this respect: 'We've been far too slow to move in the direction of hybrid learning. The question is… how do we make that standard practice?'

High Tech High is one such island – a network of schools that was and is ahead of the pack in the global move towards a 21st-century education. Through project-based learning and community internships, students take on real-world challenges and come up with innovative solutions, rather than focusing on rote memorisation of concepts. Teachers are empowered to create forward-looking, innovative lessons to inspire students. The incredible results speak for themselves: 100 per cent of graduates are admitted to college, 35 per cent of college-goers are the first in their family and 30 per cent enter the maths or science field (compared to an average of 17 per cent).[117]

Gezhi High School, a high-performing school in Shanghai, is another example. Students, parents and teachers there have accumulated over 600 patents in the past few years, 40 per cent of which relate to environmental sustainability.[118]

The education system of the future has to structurally foster these islands of innovation and scale them up. In other words, whole system reform, which itself only emerged as a coherent concept in the past 15 years, will not be enough. We need to find ways of integrating into it a systemic capacity to innovate. Unfortunately, much of the education reform debate in recent decades has set up whole system reform and innovation in opposition to each other with the result that more heat than light has been generated. In fact, the two can and, we

117 See http://www.hightechhigh.org/

118 Ben Jensen, in conversation with staff at the school

would argue, must go together. The key questions are how to create structures and relationships within systems where information and ideas flow in all directions and leaders at all levels rise above the increasingly sterile debates of recent years. Figure 10 highlights just a few of the dichotomies that should be seen as combinations.

Figure 10
From seven false dichotomies to seven combinations

Universal standards	~~OR~~ AND	Personalisation
Whole systems	~~OR~~ AND	Autonomous schools
Best practice	~~OR~~ AND	Innovations
Teaching	~~OR~~ AND	Technology
Disciplinary	~~OR~~ AND	Interdisciplinary
Public	~~OR~~ AND	Private
Strategy	~~OR~~ AND	Implementation

Eric Ries in *The Lean Startup* describes the need for rapid iteration of concepts through active customer feedback. The Education and Human Capital Requirements Roundtable called for building 'a resilience into education systems, improving their ability to respond to rapidly changing needs by allowing for as much 30 per cent or more customisation and adaptation.'[119] In essence, education systems need to think like the 'lean startups', finding these innovations from within the systems or from the emerging ecosystem of education start-ups that are able to tackle market needs faster than ever before. In Hong Kong, teachers have been challenged by the system to innovate by, for example, being required to teach classes of different durations or entirely without a curriculum.

As Charles Leadbeater has shown there are four different segments of potential innovation and, as the technology develops, systems need to foster innovation in each of the segments.

119 Fadel 2012: 19

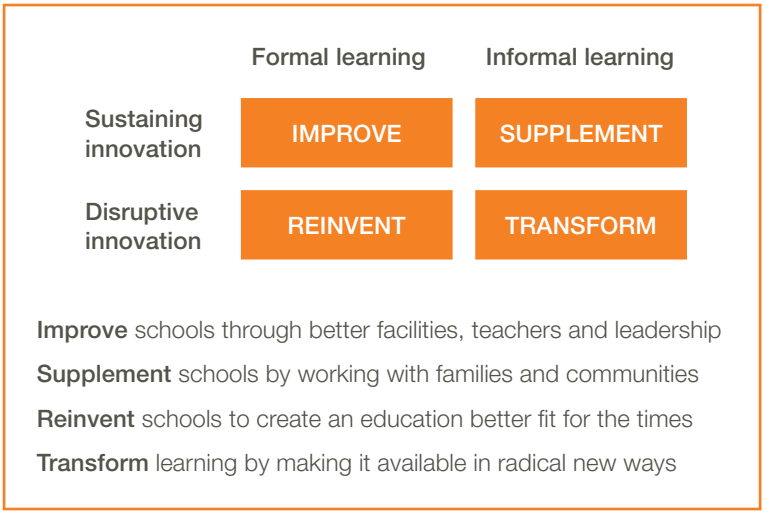


Figure 11
How we categorise learning innovations

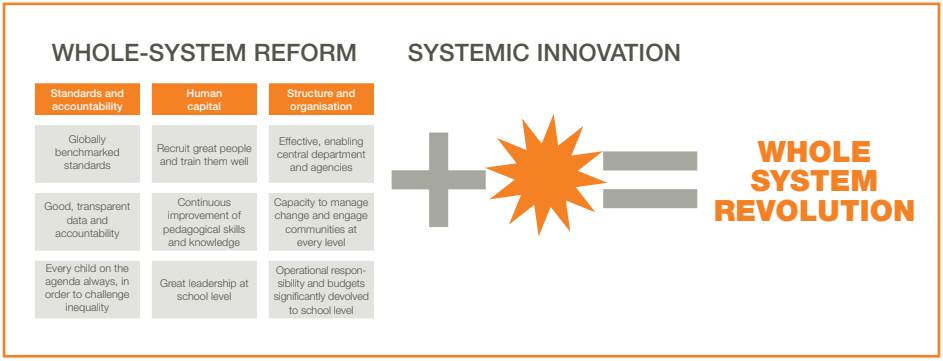
Source: Leadbeater and Wong 2010: 4

Schools of the future will need both teachers and researchers, and people who combine both roles, as happens at Raffles Girls' School, led by principal Julie Hu. Schools and systems need to be constantly testing new techniques to continuously invent best practices, with the system acting as a forum for sharing and scaling these best practices. Research groups of teachers in Shanghai are an example of moving towards this approach, as are the teacher networks in Ontario and the professional learning communities in Singapore.

Similarly, governments should be open to adapting proven techniques pioneered by start-ups and the private sector to deliver better outcomes at less cost. The low-cost private school revolution around the world is a prime example of such innovations (and another example of jugaad innovation). In emerging markets around the world, these schools, often charging less than $5 a month, are able to deliver better educational outcomes at less cost than government systems. Some countries have seen these as a threat to public education dominance, and are stifling the schools with legislation. Others, such as Punjab in Pakistan have seen them as a complement to the public system, choosing to fund them and increase access to them. Indeed, around the world, while the evidence is mixed and the idea controversial, it is our view that choice, vouchers for low-income students and the encouragement of alternative providers are likely to become increasingly important ingredients of systems which combine effective whole system reform with serious innovative capacity.

We describe this combination of whole-system reform with innovative capacity as *whole-system revolution*. What this looks like, precisely, remains to be defined, but we hope by pointing to it we can begin that process.

Figure 12
Whole-system revolution



In summary, to be successful in the 21st century, systems need not only to drive forward whole-system reform, based on the evidence; they also need the capacity to innovate, to learn from that innovation and continuously improve the system. Bring on the whole-system revolution!

4.
CONCLUSION

It is impossible to anticipate what changes the next 50 years will bring, but some of the elements that will drive that change can be predicted. We face some truly fundamental challenges that need to be overcome if the nine billion people living on Earth in 2050 are to lead fulfilled lives – the nature of the economy, the health of the environment and the avoidance of catastrophic conflict, to name just three. We also know that the pace of innovation will continue to accelerate in science and technology, posing all of us the challenge: can the search for social solutions – that seize the good from science and technology and prevent the harm – keep up?

All this is happening in a G-zero world in which a historic transition from Atlantic global leadership to Pacific global leadership is evidently taking place. Meanwhile, the nature of global leadership itself is changing as the problems we seek to solve become more complex and less amenable to the diplomatic means of the Cold War and before.

These features of the future raise many questions, some far beyond the scope of this essay. What is clear, though, is that education – deeper, broader and more universal – has a significant part to play in enabling humanity to succeed in the next half century. We need to ensure that students everywhere leave school ready to continue to learn and adapt, ready to take responsibility for their own future learning and careers, ready to innovate with and for others, and to live in turbulent, diverse cities. We need perhaps the first truly global generation; a generation of individuals rooted in their own cultures but open to the world and confident of their ability to shape it. As the slogan of the London 2012 Olympics points out, we need to 'Inspire a Generation'.

The growing pace of change and increasing complexity mean that global leadership will no longer be merely about summits behind closed doors. In an era of transparency, leaders will find themselves constantly in dialogue with those they purport to lead. Meanwhile, innovations which transform societies can and will happen anywhere. Leadership, in short, will be widely dispersed and will require increasing sophistication.

It is in these circumstances that the Pacific seems destined to become the focus of global leadership. The economic and educational achievements of the Pacific region in the past 50 years are spectacular

– unprecedented in fact. They lay a foundation for the next 50 years – a much better foundation than exists in many Atlantic systems – but the mix of factors that brought those achievements will not be capable of meeting the challenge ahead.

Among other things, an education revolution will be required. It will need to be based not just on the growing evidence of what works, but on the capacity of the systems to innovate. It will need to unleash the leadership capacity that the next 50 years will demand. The Pacific region's future and its capacity to become an ocean of innovation is being shaped today, tomorrow and every day in the classrooms of Singapore and Kuala Lumpur, Melbourne and Valparaiso, San Francisco and Vancouver, Vladivostok and Shanghai, Hong Kong and Hanoi. On the success of those endeavours, all our futures depend.

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APPENDIX: INTERNATIONAL COMPARISONS

Indicators	Education system (2010)		Labour market					
	Public expenditure on education as % of total government expenditure*	School life expectancy (Primary to tertiary)	Labour force by educational attainment (2008)			Employment and wages (2011)		
			Pre-primary & primary attainment (%)	Secondary attainment (%)	Tertiary attainment (%)	Recorded unemployment (%)	Average gross wage (US$)	Overall productivity of labour**
Australia	12.9	19.6	27.3	38.9	33.8	5.0	50,280	71,540
Brunei	13.7	15.0	…	…	…	…	…	…
Canada	12.3	15.1	13.5	40.0	46.5	7.4	45,600	70,680
Chile	18.2	14.7	24.0	48.9	25.9	7.4	9,780	34,990
China	…	11.7	…	…	…	6.5	6,468	13,240
Chinese-Taipei	…	…	…	…	…	4.4	22,800	78,600
Hong Kong-China	20.2	15.5	…	…	…	3.3	18,240	85,900
Indonesia	17.1	12.9	65.6	22.3	7.1	6.7	2,892	9,020
Japan	9.4	15.3	58.6	…	41.4	5.5	44,640	63,820
Malaysia	18.9	12.6	…	…	…	3.1	8,064	33,850
Mexico	21.6	13.7	57.0	20.2	17.3	5.5	5,208	32,390
New Zealand	16.1	19.7	17.9	41.2	36.2	6.5	34,800	51,310
Papua New Guinea	…	…	…	…	…	…	…	…
Peru	17.1	13.2	…	…	…	7.1	11,904	26,290
Philippines	15.0	11.7	…	…	…	7.0	1,824	9,000
Russia	11.9	14.3	5.6	40.4	54.0	6.8	9,312	29,500
Singapore	10.3	…	24.2	49.9	25.8	1.9	39,240	69,200
South Korea	15.8	17.2	…	…	…	3.4	33,600	57,290
Thailand	22.3	12.3	…	…	…	1.0	3,768	14,190
United States	13.1	16.8	…	…	…	9.0	50,520	95,940
Vietnam	19.8	11.9	…	…	…	4.1	1,116	5,750
Source	*UNESCO*	*UNESCO*	*ILO*	*ILO*	*ILO*	*EIU*	*EIU*	*EIU*

Source: Inspired by appendix B in Hanushek EA, Peterson PE and Woessmann L (2012) *Achievement Growth: International and US State Trends in Student Performance*, Cambridge, MA: Harvard PEPG/Education Next

Notes:

* Various years, all most recent available

** GDP at US$PPP per worker in 2005 US$

Table A1: International comparisons – education and socioeconomic indicators

Indicators	Tests at grade 8					Tests at grade 4		
	Grade 8 – PISA (2009)			Grade 8 – TIMSS (2007)		Grade 4 – PIRLS (2006)	Grade 4 – TIMSS (2007)	
	Overall reading literacy	Mathematics literacy	Science literacy	Mathematics achievement	Science achievement	Reading literacy achievement	Mathematics achievement	Science achievement
Scale average	493	496	501	500	500	500	500	500
Australia	514.9	514.3	527.3	496.2	514.8	...	516.1	527.4
Brunei	...	...	...	...	...	...	...	...
Canada	524.2	526.8	529.0	518.3	519.5	557.7	510.3	...
Chile	449.4	421.1	447.5	...	413.0	...	...	...
China	...	...	...	...	...	...	...	...
Chinese-Taipei	495.0	543.2	520.0	598.3	561.0	...	576.0	557.0
Hong Kong-China	533.2	554.5	549.0	572.5	530.2	564.0	606.8	554.2
Indonesia	401.7	371.3	382.6	397.1	427.0	405.0	...	...
Japan	519.9	529.0	539.4	569.8	553.8	...	568.2	547.8
Malaysia	...	...	...	473.9	471.0	...	...	...
Mexico	425.3	418.5	415.9	...	...	...	...	...
New Zealand	520.9	519.3	532.0	...	...	532.0	492.5	504.1
Papua New Guinea	...	...	...	...	...	...	...	...
Peru	370.0	365.1	369.0	...	...	...	...	...
Philippines	...	...	...	...	...	...	...	...
Russia	459.0	467.8	478.3	511.7	529.6	565.0	544.0	546.2
Singapore	525.9	562.0	541.7	592.8	567.3	558.0	599.4	586.7
South Korea	539.0	546.2	538.0	597.3	553.1	...	...	...
Thailand	421.4	418.6	425.3	441.4	470.6	...	...	...
United States	499.8	487.4	502.0	508.5	520.0	540.0	529.0	538.6
Vietnam	...	...	...	...	...	...	...	...
Source	*OECD*	*OECD*	*OECD*	*IES*	*IES*	*IES*	*IES*	*IES*

Table A2: International comparisons – cognitive skills and educational attainment

This essay assumes the near certainty that the Pacific region will take primary leadership of the global economy in the near future and explores the implications for their education systems.

It explores the historic insights that can be taken from the Atlantic's rise to global leadership and outlines the economic transformation over the last 50 years that has shifted leadership from the Atlantic to Pacific Asia.

On this foundation, the authors lay out a new model for fostering innovation among individuals, teams, organisations and society as a whole. They recommend a combination of best practices in coherent reform of education systems together with the latest thinking on unlocking systemic innovation to produce the 'whole-system revolution' that will be required to inspire a generation and produce global leaders who are able to rise to the challenges of the 21st century.

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