

METASCAN 4

THE FUTURE OF ASIA: IMPLICATIONS FOR CANADA
A FORESIGHT STUDY



THE
FUTURE
OF ASIA



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HOW TO NAVIGATE METASCAN4:



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Executive Summary


Over the next 10–15 years, the world will experience two influential sources of change: the rise of Asia and the accelerating advancement of digital technologies. This study uses strategic foresight methods to examine the potential surprises and disruptions that could result as these two forces collide and interact to shape the future of Asia and the world. The study does not predict a particular future, but explores a range of plausible futures to critically assess current assumptions about Asia and better understand the policy challenges and opportunities that could arise for Canada.

ASIA'S RISE: With a growing economy, expanding middle-class and rising geopolitical clout, Asia is expected to play an increasingly influential role on the world stage. With a projected population of five billion people by 2030¹, Asia could eventually dominate the international economic and geopolitical order. Global trade patterns are already shifting to Asia as India and China exert more global economic and political influence. Asia's most powerful leaders are proving to be strategically adept at driving the international policy agenda and capable of challenging the primacy of western-based institutions. Notwithstanding Asia's diversity and complexity, emergent changes at the scale of the continent are transforming both Asia and the world. This study moves beyond the usual country level analysis to explore these broader system level changes, focusing on developments in the economic, social, energy and geostrategic systems in Asia and interactions among them.

THE DIGITAL REVOLUTION: In parallel to Asia's rise, the accelerating development and application of technologies including artificial intelligence (AI), data analytics, sensors, robotics, virtual telepresence and the Internet of Things

are starting to transform economies and societies everywhere. By 2030, almost all of the world's population will have access to low-cost Internet connected smart devices linking them to global society, consumer markets, education, and work opportunities. New business models will emerge and expand, whole industries may experience more rapid cycles of rise and decline, and governments may find their policies outdated for the economic, political and security realities of the digital world.

ASIA MEETS THE DIGITAL REVOLUTION: The convergence of Asia's rise and the digital revolution has the potential to trigger unexpected impacts with global repercussions. The two forces may amplify each other as Asia's need for infrastructure creates markets of a scale that drives rapid technological innovation and brings down costs, while massive government investments in digital connectivity, renewable energy and skills position many Asian countries for success in the new economy. At the same time, rapid changes in the economy, employment, values and security brought on by the digital revolution could also breed instability, particularly in the context of high citizen expectations and fragile governance regimes. Just as Europe and



the United States (U.S.) dominated the industrial revolution, a number of Asian countries are planning to ride the wave of the digital revolution to greater prosperity and global influence — and many have the potential to do so. However, Asia's rise in the digital era may not replicate the American hegemony of the industrial era, as the powers of the nation-state are challenged by a more interconnected digital world. Multiple future scenarios are plausible, and in the context of rising uncertainty, deserve to be considered.

USING FORESIGHT TO EXPLORE IMPLICATIONS FOR CANADA: Since Canada's future could increasingly be shaped by Asia, exploring some of the unexpected policy challenges and opportunities that may lie ahead is a prudent exercise. This study used the *Horizons Foresight Method* (described in Appendix 1) and takes the reader through a thought process that is intended to stimulate his or her own thinking about how changes in Asia could reshape Canada's economy and society. It begins by listing some commonly held assumptions that consciously or unconsciously shape the policy designer's thinking about the expected future for Asia. The study then identifies a number of insights about potentially disruptive changes that could alter Asia's expected future and uses a range of future scenarios to explore how these disruptive changes could interact to create surprises. Next, it describes some of the key policy challenges and opportunities that Canada may confront as a result of these potential changes. Finally, it tests the initial commonly held assumptions against the findings of the study in order to develop more

robust assumptions for use in policy, planning and research.

KEY FINDINGS: While each reader will reach their own conclusions, the study identifies some key areas of change in Asia that Canada could anticipate and prepare for. These are not based on what is most likely, but rather on what is sufficiently plausible and disruptive to be worthy of the attention of policy makers.

Highlights include:

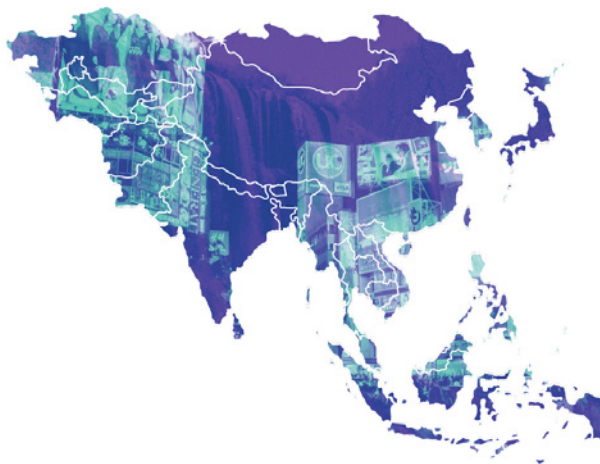
- **Asia's digital leap:** Due to Asia's infrastructure deficit, it is leap-frogging the West and building modern, fast, cheap and smart digital infrastructure. This digital connectivity may equip a large portion of Asia's population to enter the global workforce and consumer market in ways that could accelerate the global transition to a digital economy. New technologies, job unbundling and radically evolving business models may be embraced and scaled up in Asia leading to downward pressure on incomes and prices, particularly in the West. Canada could face an extended period of economic and social disruption while governments, firms and individuals learn how to adapt to the new realities of a global digital economy.
- **Asia moves into virtual work and global digital services:** As manufacturing jobs are lost to automation, Asia may use its low-wage advantage to move into global digital services for both high- and low-skilled work. Canadians may find competition coming from unexpected places, but also emerging opportunities to work in new ways.

-
- **Asia's declining demand for oil:** A variety of economic, technological, public health and policy decisions could shift Asia away from oil for transportation leading to lower than expected Asian demand for petroleum products and weaker global crude oil markets. As a relatively high cost oil producer, Canada may be challenged to compete against lower cost oil producers who are able to maintain supplies at lower prices to retain their market share.
 - **Asian cooperation and declining western influence:** Asia may develop regional institutions that facilitate deeper economic, diplomatic and security ties in the region. While consensus is more likely in economic areas, a more united Asian voice could reshape agenda-setting, norms and decision-making while reducing western influence in the region and internationally.
 - **New Asian models:** Asian societies are going through massive and rapid changes that will require extensive innovation in areas as diverse as consumer goods, health care, education and governance. Canada may be able to learn from Asia's rapid advancement, adopting lower-cost or more effective strategies.

NEXT STEP — DIALOGUE: This study is the product of a capacity building exercise that involved Horizons staff, 60 public servants and dialogues with 30 Asia experts.² The ideas are intended to encourage further dialogue and debate on core assumptions and emerging challenges and opportunities to help develop robust policies and strategies to address them. The study offers a new perspective by exploring a range of plausible futures beyond the expected future, and may assist Canada to prepare for the changes that lie ahead.

EXCLUSIONS: This study considered but did not develop detailed analysis on issues such as: demographics, aging, youth, religion, ethnic and border conflicts, climate and environmental issues, food and water security, and infrastructure, etc. These issues have been dealt with in depth by others.

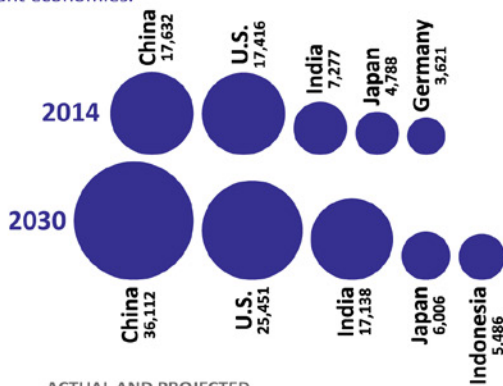
A NOTE TO THE READER: The study is best read online as it contains a number of hyperlinks to videos and visuals to help immerse the reader into the future. Four supporting cluster papers for additional insights, policy challenges and opportunities in each of the four domains are also available. A glossary of key terms is included in Appendix 2.



Forces of Change Collide ³

WHO'S IN THE CLUB?

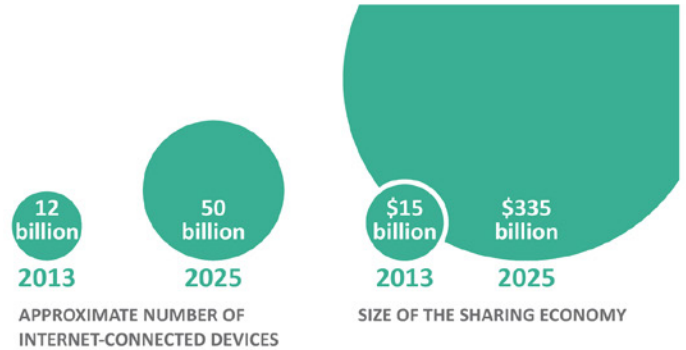
By 2030, India will join U.S. and China as the world's three most important economies.



ACTUAL AND PROJECTED TOP 5 ECONOMIES ranked based on GDP in PPP terms, 2011 US\$B

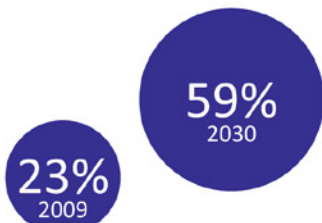
DIGITAL ECONOMICS

Digital technologies, including artificial intelligence, robotics, 3D printing and the Internet of Things, are transforming manufacturing supply chains, service delivery and consumer behaviour.



DIFFICULT TO IGNORE

By 2030, Asia's large population will be the most significant consumer market.



ASIA'S SHARE OF GLOBAL MIDDLE CLASS CONSUMPTION

Growing Share of GDP

Growing Middle Class

Demographic Window

THE RISE OF ASIA

THE DIGITAL REVOLUTION

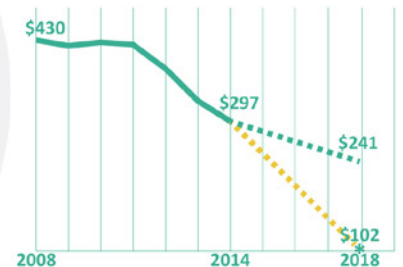
Ubiquitous Connectivity & Energy

Affordable Ultra-Smart Devices

Digital Economy

DOWNWARD PRESSURE

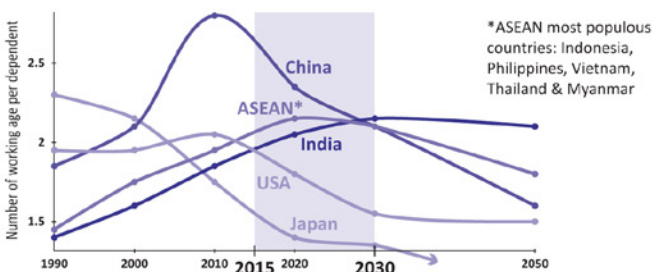
Competition from open source alternatives is driving down the cost of digital devices. Lenovo's A1900 smartphone will roll out in 2015 in India for as low as \$42.



AVERAGE GLOBAL SMARTPHONE PRICE AND PROJECTIONS *emerging markets

TIME TO SHINE

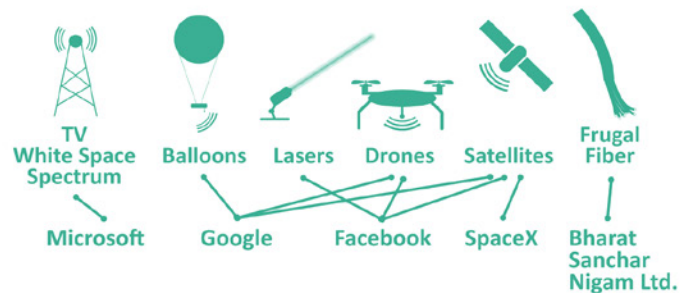
Some of Asia's most populous countries will benefit from a demographic window (when a country's working age group is high, relative to dependents), offering potential for continued economic growth.



RATIO OF WORKING AGE POPULATION TO DEPENDENTS Dependents aged 0-14 & 65+, working age 15-64

DOWNTOWN TO BACKWATER

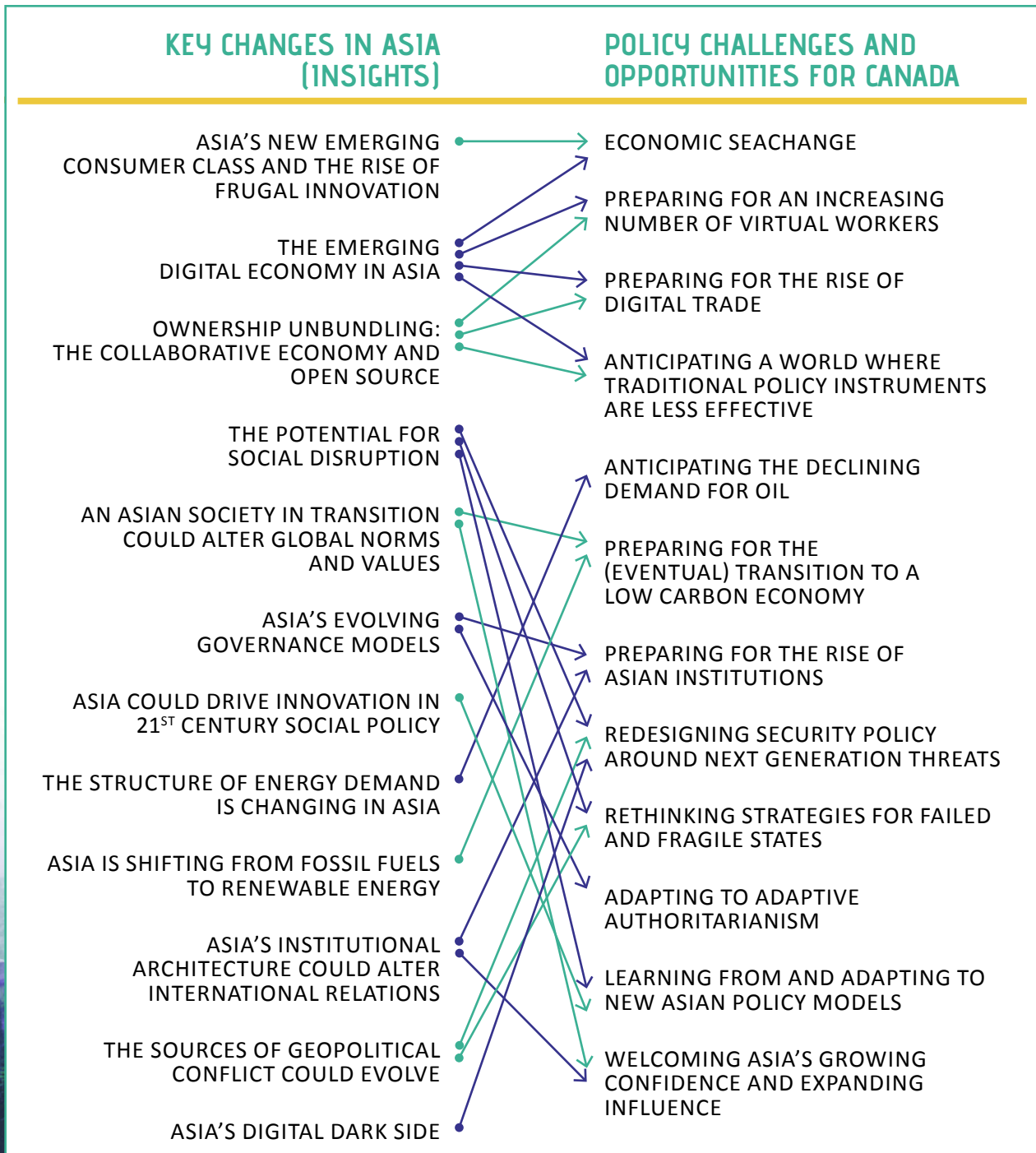
Last-mile technologies and distributed energy solutions will provide Internet connections to even the most remote areas.



TECHNOLOGIES TESTED BY COMPANIES DEVELOPING VIABLE BUSINESS MODELS FOR REMOTE INTERNET SERVICE DELIVERY

Summary of Insights and Policy Challenges and Opportunities

The following table summarizes the key changes (insights) that are shaping Asia and the potential policy challenges and opportunities for Canada explored in this study.



The Expected Future

Commonly Held Assumptions About the Future of Asia

Commonly held assumptions about the most likely or expected future are embedded in current policies and policy dialogue. These assumptions shape current thinking. Identifying them is the first step in the *Horizons Foresight Method*.

The rising power and influence of Asia is widely seen as one of the defining forces of global change in the coming decades. Governments, businesses and international organizations are reorienting their strategies based on such assumptions about the most likely future development of Asia and its potential impact in the world. Some of these assumptions include:

1. Asia's economies will grow and become the centre of gravity and the driver of growth in the global economy.⁴
2. The further integration of Asia in the global economy will continue smoothly.⁵
3. Asia will have a larger middle class than the West.⁶
4. Competition from lower-cost Asian labour is likely to slow in coming decades as wages rise in Asia.⁷
5. Trade liberalization will reduce barriers and expand trade flows.⁸
6. Most government policy instruments will remain relevant and effective in the years ahead.⁹
7. Asia's demand for fossil fuels will continue to grow over the next 10-15 years.¹⁰
8. Despite growing concerns over pollution, economic growth will continue to trump environmental concerns in Asia.¹¹
9. Intense rivalry among Asian powers will prevent significant economic or political integration in the region.¹²
10. Asia's security institutions are prepared to address security threats and emerging challenges.¹³
11. A growing Asian middle class will pressure their governments to become more democratic.¹⁴
12. As Asian societies rapidly urbanize and further integrate into the global economy, they will be torn between modern "western" values and traditional "Asian" values.¹⁵

These assumptions are neither incorrect nor guaranteed to transpire. This study explores alternative ways that the future of Asia could plausibly diverge from this expected future, and the potential implications for Canadian policy.



Insights About Change in Asia

Insights describe developments that could generate significant disruptive change in one or more of the Asian sub-systems explored in this study: economic, social, energy, and geostrategic. An insight is built by scanning for “weak signals” of a change that, if it were to strengthen, could lead to a significant and surprising divergence from current assumptions about the expected future. Insights are not predictions but rather explorations of plausible high-impact alternatives (or “what ifs”) to be considered in order to develop policies that are more robust across a range of potential future conditions.



ASIA'S NEW EMERGING CONSUMER CLASS AND THE RISE OF FRUGAL INNOVATION

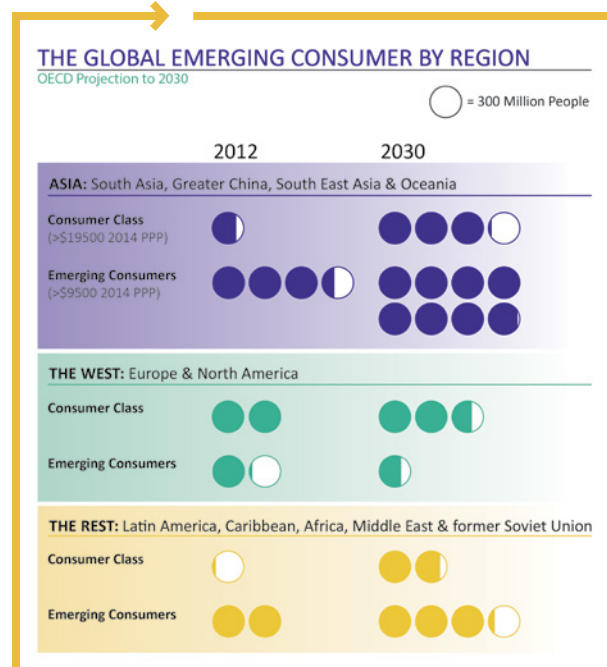
An emerging consumer class of 2.4 billion people in Asia could demand inexpensive products, spur new low-cost business models and lead to the rise of a new generation of Asian corporations that reshape the very nature of the global economy.

Emerging Consumer Class: Potentially more significant than the tripling of Asia's traditional consumer class (i.e. middle class) to one billion people by 2030 could be the rise of 2.4 billion **emerging consumers** in Asia, with annual incomes between approximately \$10,000 and \$20,000 (see Figure 1).¹⁶ The size of this group, combined with their near universal digital connectivity to e-commerce by 2030, means that their influence will be too significant to ignore and may drive companies to engage in frugal innovation to capitalize on this massive combined consumer market.

Frugal Innovation: As Asian economies continue to evolve, low-income consumer demand could drive companies to increasingly adopt frugal innovation processes (see box on page 12).¹⁷ Signs of frugal innovation can already be seen in Asia in the production of cars, smartphones, tablets, pharmaceuticals and industrial design,¹⁸ as well as in key services such as banking.¹⁹ In the smartphone market, while technology leaders, Apple and Samsung, have fought globally over the high-end of the market, new competitors have taken hold of market share in developing Asia. Using frugal methods, China's Xiaomi has emerged as a dominant smartphone vendor in both India and China²⁰ while India has launched

multiple home-grown frugal smartphone vendors of its own. These Indian competitors are making inroads in the low-cost local market, but like Xiaomi, have aspirations for global distribution.²¹ These companies are seizing market share by concentrating on overlooked consumers²² such as the **emerging consumer class**, where firms will expect volume to offset razor-thin profit margins.²³ The concept of frugal innovation is not entirely new to western business, which has already experimented with many new business models, including hyper-aggressive pricing. For example, leveraging the negligible cost of digital distribution, Google has created an entire ecosystem of free software (so called 'freemium' marketing), all of which funnel users to its Internet search tools that derives the majority of its advertising revenue. Amazon, the traditional leader in the global marketplace has operated for 21 years, sacrificing profits for revenue growth. However, new competitors such as China's Alibaba

FIGURE 1



FRUGAL INNOVATION

Is a process that “discovers new business models, reconfigures value chains, and redesigns products to serve users who face extreme affordability constraints, in a scalable and sustainable manner. It involves either overcoming or tapping institutional voids and resource constraints to create more inclusive markets”. See video: [Rise of the Frugal Economy](#) (5:12 mins).

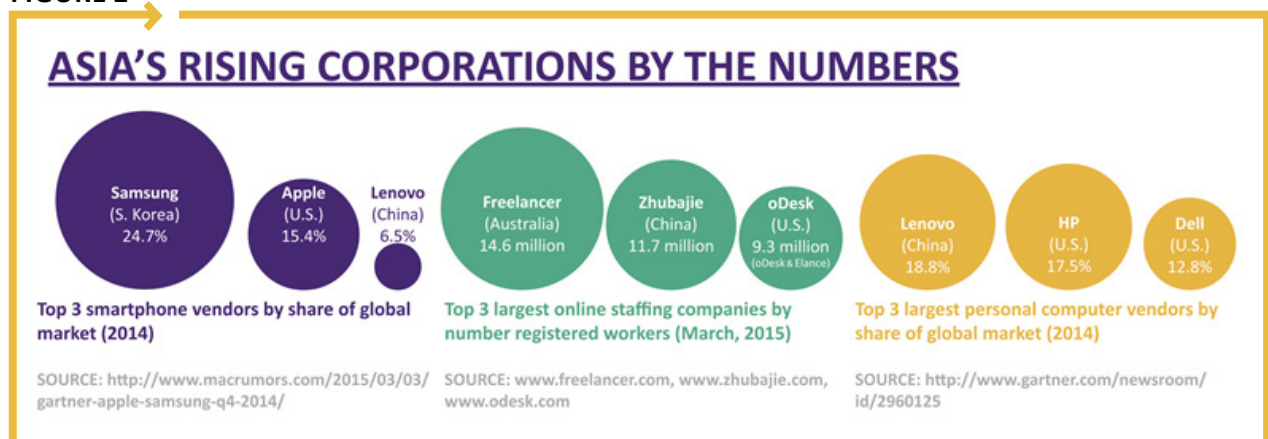
India’s Tata Motors makes the Nano car, retailing at about US\$ 3,000.

The Aakash tablet created for the Indian market currently sells for as low as US\$ 55.

and its push into western markets²⁴ will put these strategies to the test. If firms (both Asian and western) choose to pursue a frugal development path, this could impact all levels of society as many of the products may be equally appealing to middle class consumers around the world, potentially disrupting many traditional industries and business models.

Asia’s Emerging Corporations: These companies are potentially well-placed to capitalize on the emerging consumer market in Asia, and then use this as a springboard to enter and disrupt higher-priced global markets elsewhere. Contrary to the common perception of Asian corporations as mere followers of innovations developed in Silicon Valley and the West, the business sector of Asia continues to mature, surpassing North America in 2014 as the headquarters of top international corporations,²⁵ many of which are emerging as global leaders in innovation (see Figure 2).²⁶ If Asia succeeds in capitalizing on its rising domestic human capital (especially in Science, Technology, Engineering, and Mathematics (STEM) subjects) and in attracting top global talent from research and development (R&D) positions in the West (including the large proportion of Asian graduate students in western universities²⁷ and think tanks), the percentage of Asian-based top global corporations in 2030 may rise significantly. This may create a virtuous circle, driving further investment, trade and market focus in and on Asia.

FIGURE 2



THE EMERGING DIGITAL ECONOMY IN ASIA

Continuing investments and advances in digital infrastructure combined with the unbundling of jobs and the growth of digital services could profoundly reshape the nature of work and commerce. As Internet speeds continue to improve and collaboration technologies mature, inexpensive smartphones, solar chargers and wireless connectivity could afford even the poorest urban and rural Asian citizens an opportunity to participate in the global economy as virtual digital workers, serving customers worldwide.

As Internet speeds continue to improve and collaboration technologies mature, inexpensive smartphones, solar chargers and wireless connectivity could afford even the poorest urban and rural Asian citizens an opportunity to participate in the global economy as virtual digital workers, serving customers worldwide.

Leap-frogging Digital Infrastructure: Active state intervention in key Asian countries, such as China and South Korea,²⁸ has led to rapid adoption of more advanced data infrastructure than in many parts of the West that rely exclusively on private providers. Asian nations are leap-frogging existing technologies, building a faster, cheaper digital infrastructure. For example, South Korea’s Internet connections average speeds conservatively measured at 2.5 times faster than those in the Canada for one quarter of the price.²⁹ China has released a plan to spend more than \$182 billion on fibre and 4G technologies to boost Internet speeds by the end of 2017.³⁰ Asia’s performance in overall [digital preparedness](#) has been growing steadily over the past five years while that of most western countries has been stagnant or slipped.³¹ These growing digital infrastructure investments could position Asia to capitalize on new technologies and dominate key areas of the emerging global economy.

Job Unbundling and Wage Convergence: The unbundling of jobs is an ongoing process in which [freelancing](#) eventually decomposes

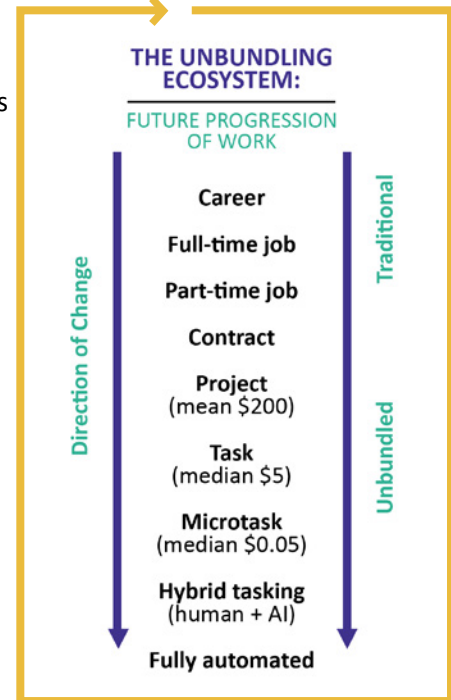
many jobs to their constituent parts as seen in Figure 3. This allows for more efficient, cost-optimized bidding by workers that is increasingly independent of location. Led by firms such as eLance.com, Freelancer and China’s Zhubajie (at the project level) and

by Amazon’s Mechanical Turk (for tasks and micro tasks), Asia holds [5 of the top 10 spots](#)³² for freelancing in a projected \$5 billion industry³³ in 2015. Nations such as the U.S. are expected to have freelance work

represent up to [50% of employment](#)³⁴ as early as 2020. Given that much of Asia currently has a significant wage-rate advantage over the West³⁵ and is capitalizing on investments in digital infrastructure, a global move to greater job unbundling could favour Asian workers and trigger an accelerated convergence of global wage-rates.

The Rise of Global Digital Services: As industrial processes continue to automate through AI, [next-gen robotics](#),³⁶ and the deployment of evolving technologies such as [3D printing](#),³⁷ the number of manufacturing jobs in the future is expected to decline [significantly both in Asia and in the West](#).³⁸ As manufacturing further

FIGURE 3



automates, Asia will likely pursue the development of global digital services as the primary path to raising employment and incomes in Asia.³⁹ Evolving digital tools such as telepresence technologies⁴⁰ and augmented reality, combined with job unbundling, could greatly assist this transition to a greater provision of digital services via a global virtual workforce.

OWNERSHIP UNBUNDLING: THE COLLABORATIVE ECONOMY AND OPEN SOURCE

Traditional commerce, where business-to-business and business-to-consumer interactions dominate, is increasingly being undermined by new business models with radically different pricing schemes. Ownership unbundling reflects two significant forces impacting traditional ownership models — the collaborative (sharing) economy and the open source movement. There are signs that these models are now being adopted in Asian markets and could rapidly grow. Collectively, these new models of interaction allow for much more efficient usage of resources and may significantly undercut existing business models and/or drive down prices. This may have significant consequences for many economic sectors, but provides significant benefits for consumers and may lead to new business opportunities.

Collaborative Economy: The collaborative economy (also called the “sharing economy”⁴¹) relies on Internet technologies to connect distributed groups of people, allowing for the better use of goods, skills and other useful

services. The collaborative economy depends on people being able to communicate and share information, making it possible to generate trust through meaningful interactions.⁴² Collaborative economy models have evolved rapidly in the 21st century, facilitated by mobile smart devices and [by social media](#).⁴³ These new models are now impacting all aspects of the economy, including consumption, production, finance, marketing, and distribution, as seen in Figure 4.⁴⁴ Examples of the collaborative economy in Asia include the recent [US \\$ 100 million investment in Tujia.com](#),⁴⁵ a Chinese competitor to the accommodation-sharing website [Airbnb](#) and the [recent merger](#)⁴⁶ of the top two taxi-hailing services in China in order to counter the arrival of the popular ride-sharing service, [Uber](#). Revenue from all collaborative business models is expected to have surpassed \$15 billion worldwide in 2014, with annual growth exceeding [25%](#)⁴⁷ and potentially reaching [\\$335 billion by 2025](#).⁴⁸

Open Source and Intellectual Property:

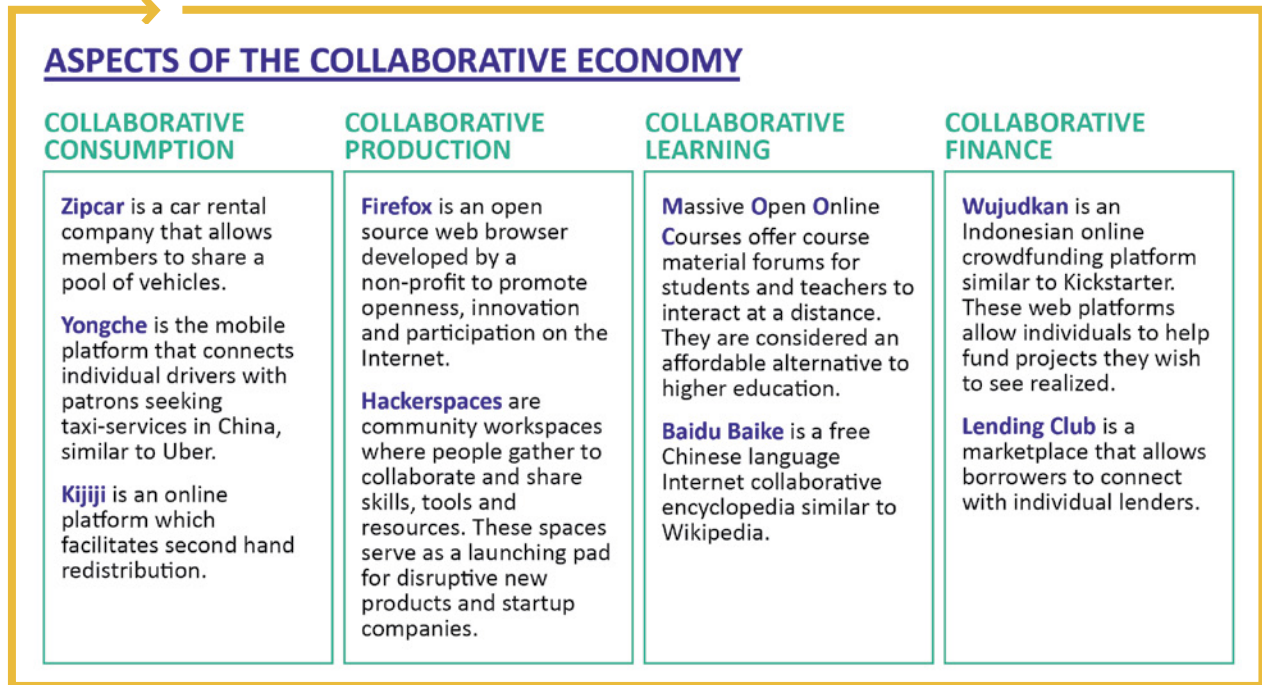
Open source represents the free use, modification and sharing of a design or blueprint. The market disruption potential is well established; open source versions of Linux have displaced Microsoft’s proprietary Windows Server product on 67.2% of the world’s web servers⁴⁹ while Google’s open source Android now runs on 84.4% of smartphones.⁵⁰ The Asian open source community is currently not large; however major Asian companies such as Huawei, Baidu and Alibaba⁵¹ are investing heavily in open source infrastructures. Further, driven by security concerns, China is planning its own desktop and mobile software to oust imported rivals

SUPPORTING VIDEO



[The evolving Sharing Economy in South Korea](#) — (1:53 mins)

FIGURE 4



from Microsoft, Apple and Google.⁵² In the next 10-15 years, open source will expand into new areas, for instance through the sharing, sale and production of 3D printing templates⁵³ or through synthetic biology, as demonstrated by the International Genetically Engineered Machine (iGEM) competition⁵⁴ (a worldwide challenge to build simple biological systems). The growth of open source emphasizes that the current western framework for intellectual property (IP) may not be appropriate for Asia as demonstrated by recent pushback from both [China](#)⁵⁵ and [India](#)⁵⁶ regarding pharmaceuticals, especially if Asian nations pursue frugal business models to meet the demands of an emerging consumer class at prices they can afford. Combined, these forces could serve to disrupt traditional business models, often moving faster than government regulation or taxation policies can react.

THE POTENTIAL FOR SOCIAL DISRUPTION

There are a number of factors that could result in social unrest and catalyze movements for reform as Asia undergoes rapid economic and technological change. Economic growth in the region has been accompanied by rising income inequality, leaving many behind. An estimated one billion people in Asia are still affected by a lack of access to basic social and economic services and employment opportunities, along with poor working conditions.⁵⁷ The region's ability to promote equity through public investment, however, will be hindered by a weak tax base and soon the rising costs of addressing aging societies and environmental pressures.⁵⁸ A concentration of coastal cities with insufficient infrastructure makes Asia among the most vulnerable to climate change disruptions;⁵⁹ food and water shortages, dislocation, and competition for scarce resources

could be sources of future popular discontent and conflict.⁶⁰ Resource use and degradation of land,⁶¹ water⁶² and air quality,⁶³ a resurfacing of long-rooted religious conflicts,⁶⁴ and recent labour⁶⁵ and pro-democracy movements⁶⁶ are raising issues that could galvanize many Asians in the Internet age. While some Asian countries have a long history of home-grown civil society movements, many Asian governments remain uneasy with social organizing: some countries are only recently increasing their tolerance of such activity (around select issues)⁶⁷ and many governments continue to suppress political dissent.⁶⁸ However, as social networks and experience grow, there will likely be more potential for an organized response at the grassroots level on any flashpoint issue. The question is whether such issues will be resolved through dialogue and reform, repression or revolution. With Asia at the centre of both rapid disruption and rising influence, emerging movements there may also articulate alternatives that resonate beyond the local scale, as Maoism and Gandhism have in the past.

AN ASIAN SOCIETY IN TRANSITION COULD ALTER GLOBAL NORMS AND VALUES

Asia is in the midst of profound cultural shifts that could impact everything from family relationships to legal and social institutions. As the world further integrates digital technologies, Asia's growing online presence will make this cultural transformation relevant for all.

Asia's Rapidly Changing Norms and Values: The pace of modernization in the world's fastest growing economic region is creating cultural change, with signs of increased [gender](#)

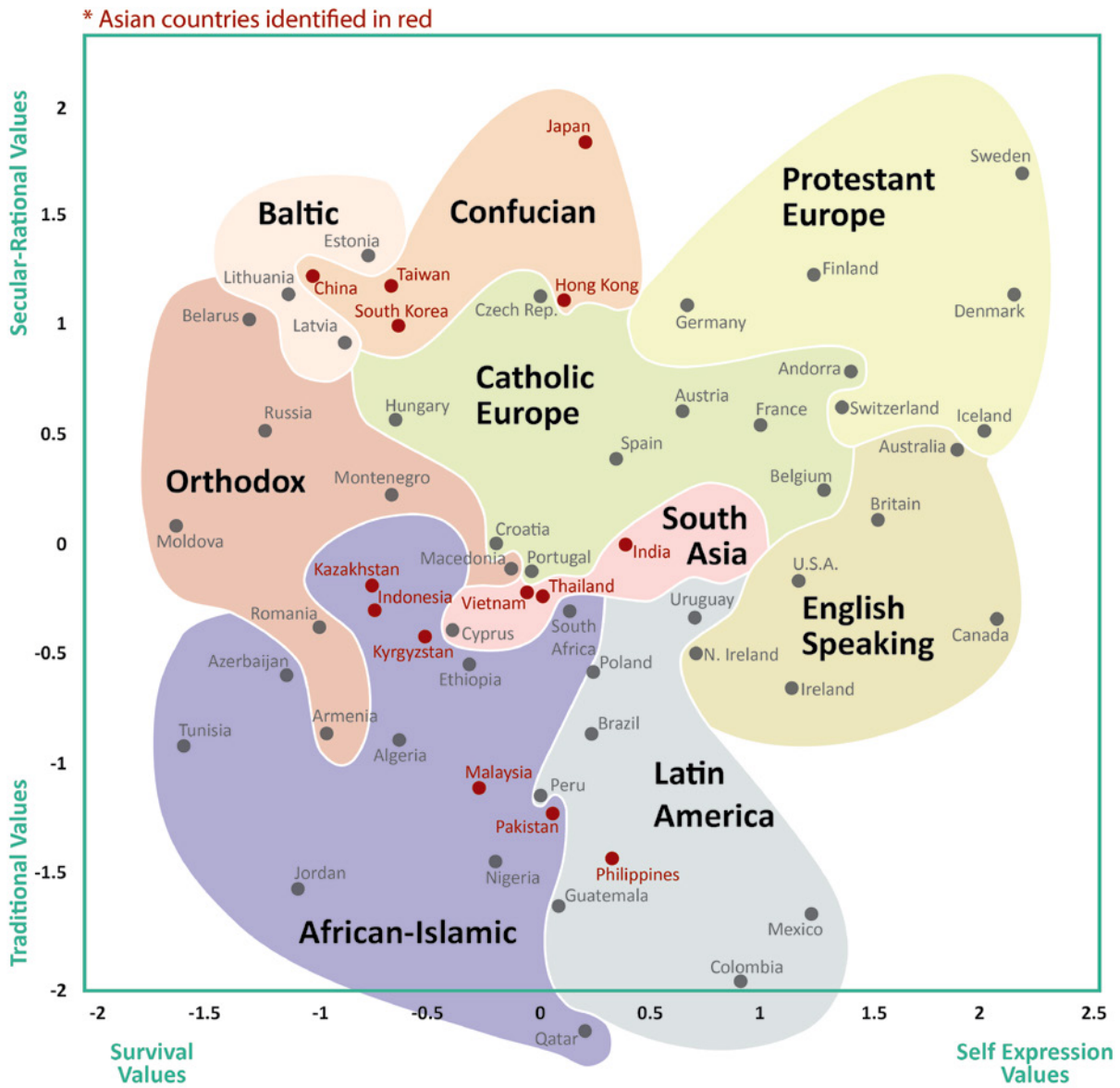
[equality](#),⁶⁹ [smaller](#) and more diverse families,⁷⁰ and [increased tolerance](#) for diversity and non-conformity.⁷¹ These changes may be indicative of developing Asia adopting more self-expressionist values (see Figure 5), including a greater interest in individual human rights and a sense of individual agency.⁷² Such a transition may provoke important debates about the role of government versus family as a source of social support. It may also stir a vibrant civil society and challenge governments to uphold democratic principles. Although this story may, on the surface, seem similar to western historical experience, Asia brings different cultural legacies (collectivist institutions, stronger governments) to a completely different era, with current challenges such as climate change, security and a rapidly changing digital economy. These may require novel responses and lead to ultimate outcomes that are unique and unexpected. For example, the growing participation and influence of Asian nations in international institutions could bring about new definitions of human rights or align global norms and regulations more closely with collectivist values.

Online Asia will be increasingly influential in shaping global norms and culture.

Due to the user-generated nature of Web 2.0 and Asia's 60% share of the global population, a majority of the content generated online in 2030 will most likely come from Asia. Integrated translation functions will allow this content to be consumed globally — YouTube, Chrome, Skype and WeChat already offer integrated machine translation functions. Asian technology firms are rapidly closing the gap with Silicon Valley (see Figure 6), developing what is arguably the world's most sophisticated app⁷³ and launching the fastest growing smartphone manufacturer.⁷⁴ The [Internet of Things](#)⁷⁵ will allow for the fusion of online and offline dimensions, changing how individuals

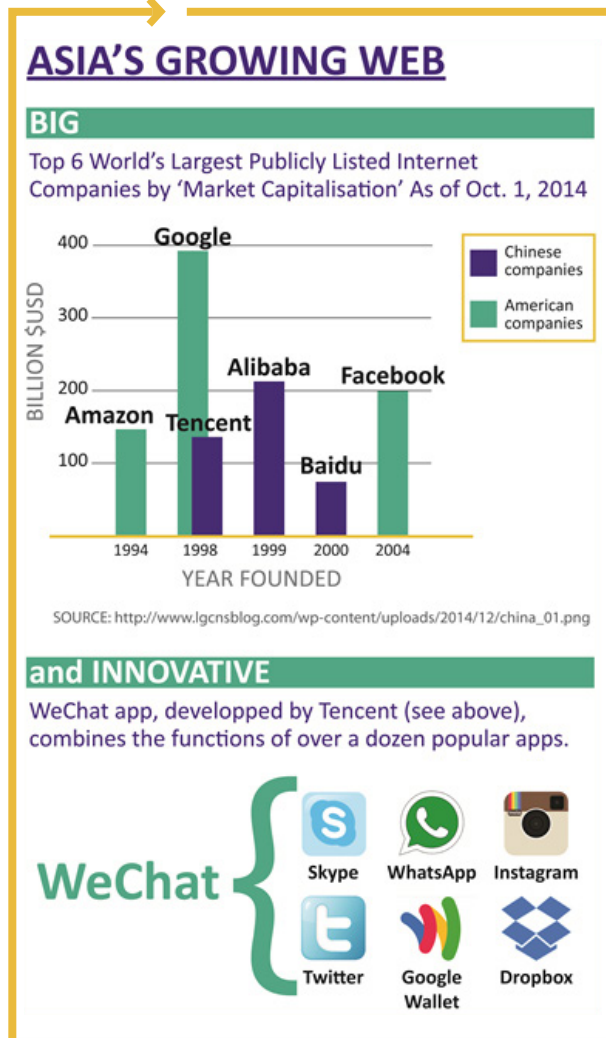
FIGURE 5

INGLEHART-WELZEL CULTURAL MAP OF THE WORLD (World Values Survey data, 2015)



Redrawn from World Values Survey: <http://www.worldvaluessurvey.org/WVSContents.jsp?CMSID=Findings>

FIGURE 6



interact with the world. As [Web 3.0](#) comes online, there will be a transition to a [Knowing Society](#),⁷⁶ where real time tracking and live data become central to many aspects of life, positioning an Asian dominated Internet as an integral part of the global creative economy. In summary, a majority of the content, platforms and devices that shape modern digital life could be produced and regulated in Asia, significantly altering the flow of cultural influence.

ASIA'S EVOLVING GOVERNANCE MODELS

The Internet is changing citizen-state power dynamics, allowing crowds to hold their governments to account and enabling governments to identify citizen concerns and build legitimacy.

Asian examples include the Indian web site [ipaidabribe.com](#)⁷⁷ and the Chinese and Korean [Human Flesh Search](#)⁷⁸ phenomenon, where crowds recreate event timelines by gathering images online. In response, some governments in Asia⁷⁹ are developing [smart censorship](#)⁸⁰ in order to proactively respond to citizen demands.⁸¹ While the Internet is changing citizen-state dynamics across Asia and the globe, its development in single party states is of particular interest. For example, China now employs roughly two million Internet Public Opinion Analysts to monitor social media with the express goal of "[stability maintenance](#),"⁸² a demonstration of the Communist Party's increased concern with public approval.⁸³ Crowds are learning to navigate sensitive issues, carefully negotiating progress without a regime change. Some states, previously considered repressive, may gain efficiency and legitimacy, even by-passing the traditional processes of democracy. Digital monitoring and empowered crowds could see authoritarian states evolve into a new model of centralized power: adaptive authoritarianism. In a growing and stable economy, this model could be interpreted as a form of digital direct democracy.

ASIA COULD DRIVE INNOVATION IN 21ST CENTURY SOCIAL POLICY

As it navigates a period of rapid change, Asia is developing unique solutions to complex challenges, potentially leap-frogging established models.

FIGURE 7

FRUGAL HEALTH INNOVATION EXAMPLE

The private **Aravind Eye Hospital Network** specializes in corrective cataract surgery, which has allowed it to optimize its operations and achieve impressive economies of scale.



Aravind doctors perform **16X** more surgeries than the national average in the U.S.

“ Aravind achieves health outcomes equivalent to their peers in developed countries. ”



Aravind surgeries cost about **\$20**, compared to an average cost between **\$3,000 - \$5,000** in the U.S.

SOURCES: <http://www.governing.com/topics/health-human-services/gov-eye-surgery-that-could-save-world.html>
<http://www.npr.org/2011/11/29/142526263/india-eye-care-center-finds-middle-way-to-capitalism/>

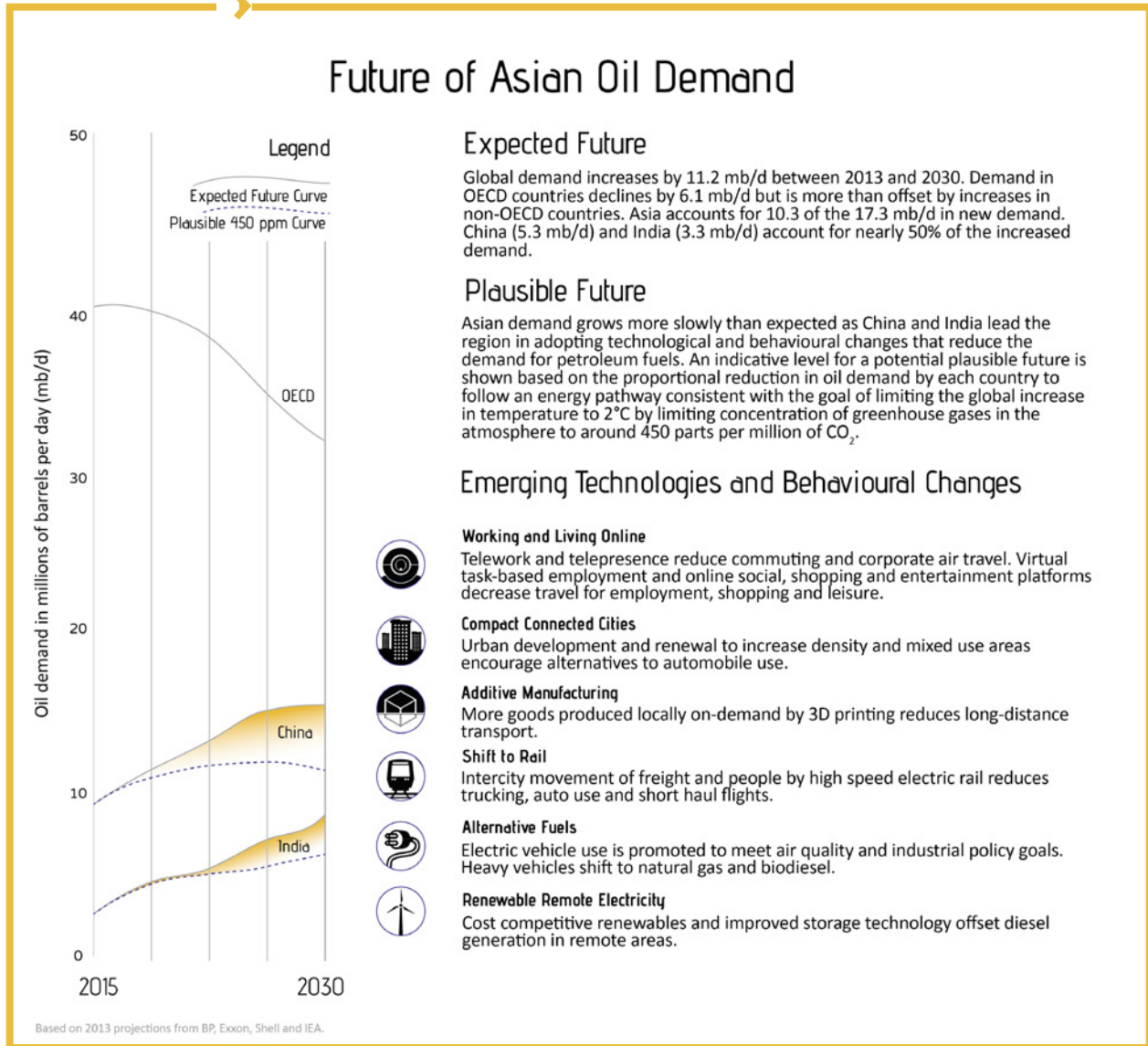
Across Asia, digital [devices](#)⁸⁴ and [distribution](#)⁸⁵ are beginning to transform education, and Asia is now the [fastest growing market](#) for e-learning.⁸⁶ As Asian governments and businesses continue to promote innovations in e-learning⁸⁷ to address a large skill gap, they may find ways to provide low-cost, high-caliber education that could evolve into world-leading frugal education models. Rapidly expanding demand for health care in Asia coupled with fewer regulatory constraints on research and development could also make Asia a development ground for new health care

tools such as 3D [printed body parts](#)⁸⁸ and frugal health care delivery models (see Figure 7).⁸⁹ As the regional market grows due to a large, aging population, Asia may emerge as a significant exporter of products and services, and a global medical tourism destination.⁹⁰ In areas where Asia successfully addresses globally relevant challenges — for example, developing efficient and effective forms of a welfare state for the digital era⁹¹ — its social policy models could become the ones to emulate.

EXAMPLES OF ASIAN INNOVATION IN [ELECTRIC MOBILITY](#)

In Japan, Toyota is developing an ultra-compact electric vehicle called “[i-ROAD](#)”. South Korea has tested an electric bus called “[OLEV](#)” which can be charged wirelessly on the road while stationary or driving, removing the need to stop at a charging station or building pantograph rail infrastructures. In China, the [Kandi EV Car-Share](#) program makes electric cars in automated garages available to customers at a rental price of US\$ 3.25 per hour, thus removing the high upfront cost barriers associated with ownership.

FIGURE 8



THE STRUCTURE OF ENERGY DEMAND IS CHANGING IN ASIA

Asian demand for oil may peak sooner and decline faster than expected. Asia is shifting from an oil-driven low-cost manufacturing economy to an electricity-driven digital manufacturing and services economy.⁹² A number

EXAMPLE

Songdo city in South Korea is an example of how the Internet of Things can be implemented throughout an urban centre to realize energy efficiencies.

of emerging technological and behavioural trends accompanying this structural change could combine to soften Asia's demand for petroleum-based fuels (see Figure 8). These include increased greater market penetration of [electric vehicles](#)⁹³ (see box on next page) and [natural gas vehicles](#),⁹⁴ efficiency gains in existing fleets from better logistics, and increased [transportation by rail](#).⁹⁵ They also include changes that reduce the need for physical transportation of goods and people, such as [additive manufacturing](#) (3D printing),⁹⁶ more virtual work and teleworking enabled by better [telepresence technologies](#),⁹⁷ and changes in urban planning that reduce travel distance and increase public transit.⁹⁸ Concerns over energy security,⁹⁹ [air pollution](#),¹⁰⁰ and growing climate change impacts¹⁰¹ may also affect oil demand through policies to reduce imports and use of petroleum-based fuels. Lower Asian oil demand could lead to lower than expected global oil demand. In an attempt to ensure their reserves are fully extracted before oil is replaced as a predominant energy source, low-cost oil producers may keep supply levels high seeking to keep prices low and drive high-cost producers out of the market.

ASIA IS SHIFTING FROM FOSSIL FUELS TO RENEWABLE ENERGY

Asia could shift further and faster than expected into a renewable energy based, low carbon economy. Advances in technology coupled with rapid price reductions are making the cost of electricity from renewable sources competitive with fossil fuel generation across most of Asia.¹⁰² Through supportive government policies and growing private investment, renewables are being widely deployed in Asia in applications ranging from [highly decentralized individual](#)¹⁰³ energy production through to [grid-connected mega-projects](#).¹⁰⁴ International connections of

national-level grids and related energy-sharing agreements are increasing renewable energy production on a regional basis by permitting countries connected to "[super-grids](#)"¹⁰⁵ to deploy technologies best matched to their comparative advantages in electricity production from wind, solar, hydro or geothermal energy. Problems related to variable supply from wind and solar are being addressed by advances in [storage and distribution management](#).¹⁰⁶ Electrification of their increasingly digitally-based economies with renewables reduces the need for trade-offs between increasing energy for economic development and reducing greenhouse gas emissions potentially allowing Asian countries to emerge as leaders in the climate change debate.¹⁰⁷ They could increasingly set the international agenda, potentially pushing for [ambitious emission reduction targets](#)¹⁰⁸ and for trade liberalization¹⁰⁹ for renewable energy goods and services as they seek to mitigate their risk from climate change and to capture global market share for low carbon technologies.

ASIA'S INSTITUTIONAL ARCHITECTURE COULD ALTER INTERNATIONAL RELATIONS

Emerging pan-Asian economic institutions, along with new trade agreements and security arrangements, could disrupt existing international governance structures by providing alternative forums and models to western-dominated institutions, relationships, and norms. The [Asian Infrastructure Investment Bank](#) (AIIB), the [Silk Road Economic Belt](#), and several regional trade proposals, among other initiatives, may create an Asia-Pacific multilateral trade and economic order.¹¹⁰ The Shanghai Cooperation Organization

FIGURE 9

THE EMERGENCE OF AN ASIA REGIONAL ARCHITECTURE:
 Will these be parallel, competing or complementary to established global structures?



DATA SOURCES:
[HTTP://CSIS.ORG/FILES/IMAGES/ASIA-REGIONAL-ARCHITECTURE-BIG.PNG](http://CSIS.ORG/FILES/IMAGES/ASIA-REGIONAL-ARCHITECTURE-BIG.PNG)
[HTTP://WWW.MERICS.ORG/FILEADMIN/TEMPLATES/DOWNLOAD/CHINA-MONITOR/CHINA_MONITOR_NO_18_EN.PDF](http://WWW.MERICS.ORG/FILEADMIN/TEMPLATES/DOWNLOAD/CHINA-MONITOR/CHINA_MONITOR_NO_18_EN.PDF)

(SCO), the Conference on Interaction and Confidence-Building Measures in Asia (CICA), and calls for a broader “[Asian security concept](#)” could likewise provide Asia with a regional security infrastructure offering local solutions to local problems.¹¹¹ Meeting the region’s demands, Asia’s institutions may displace global institutions from Asia, further insulating Asian countries from the demands placed on them by western-dominated international organizations (see Figure 9). As Asian countries become more assertive in defending regional structures, they may increasingly use Asia’s institutions as political leverage and influence overseas. Eventually, Asia’s institutions could provide a globally competitive and attractive model that gains stature in influencing broader international structures, changing the values, norms, and principles informing the current global order.¹¹²

THE SOURCES OF GEOPOLITICAL CONFLICT COULD EVOLVE

Cyber-security and failure to address the problems of fragile states could become new security priorities. A number of factors could trigger traditional geopolitical conflict in Asia: border disputes; xenophobia and nationalism, support to terrorists and fundamentalists, the race for resources; climate change and environmental refugees, and water and food scarcity to name a few. However, two issues will likely demand closer attention. Cyber-security is emerging as a significant and highly disruptive challenge, with cyber threats proliferating “exponentially faster” than the capabilities to respond to them,¹¹³ leading to potentially counter-productive reactions such as localized internets.¹¹⁴ The inability to address [cyber-terrorism and cyber-crime](#) could undermine the emerging digital economy and leave modern societies vulnerable to disruption of critical

infrastructure. The other re-emerging security challenge is fragile states. There are more than 50 in the world and six in Asia — most on the border between India and China. Intra-state conflict is an ongoing reality in several Asian fragile states. The potential for one or more of these to collapse and become failed states will likely grow in a period of rapid change. The negative consequences of failed states have been highlighted again by the rise of the Islamic State of Iraq and Syria (ISIS). Experience in Afghanistan demonstrates the weakness of current international approaches, despite billions of dollars in foreign military intervention and development assistance. There may be increased pressure to rethink how we address failed and fragile states, given the high cost of current approaches — and the even higher costs of failure.

ASIA’S DIGITAL DARK SIDE

Emerging technologies, while providing the engine of Asia’s economic development, could also greatly empower violent individuals, criminal enterprises, and militant groups, in undermining the very foundation upon which Asia’s emerging economy rests.

New technology is exposing new vulnerabilities, enabling novel forms of mass disruption and warfare that may be especially attractive to non-state groups.¹¹⁵ Drone technology, cyber currencies, the 3D printing of weaponry, and advancements in robotics and bio-weaponry could further permit individuals and groups to project power across Asia and the world. The rising relative power of Asia’s non-state actors, along with the growing interconnection between [ethnicity and politics](#), may further erode state power. Loss of territorial control may intensify competition over scarce natural resources and exacerbate food insecurities, leading to further lawlessness, criminality, and piracy.¹¹⁶

Scenarios

Four Plausible Futures for Asia in 2030

The *Horizons Foresight Method* uses scenarios to visualize how the system under study could evolve under different drivers and assumptions. In this study, four analytical scenarios were developed that examine how economic, social, energy and geopolitical factors may interact with each other and anticipated technological changes. The scenarios are not attempts to predict the future; instead, they provide an opportunity to consider how the future might emerge. They also allow the user to test current assumptions and propose policy approaches that are robust against a range of plausible futures.

Horizons uses four archetypal scenario logics that are particularly relevant for public policy. “Muddling Through” (see *Digital Asia*) explores a world where things do not get dramatically better or worse, but that looks quite different from today. “Incremental Decline” (see *Asia in Decline*) explores a world where things are generally worse than today, while “Incremental Progress” (see *Regional Asia Rising*) explores a world in which things are getting better. “Transformation” (see *Green Asia*) assumes crises that precipitate transformational change. The logic of each archetype provides the scaffolding for further developing each scenario.

As you read the scenarios, try to immerse yourself in these futures. Imagine how the insights you have read in the last section might play out, what this world would be like and what it would mean in your areas of interest and responsibility.



DIGITAL ASIA



SCENARIO

Asia is at the forefront of a rapid and disruptive transition to a global digital economy characterized by virtual project work across borders, digital value chains, renewable energy to meet the rising demand for electricity, decentralized manufacturing, and falling global prices for many services. Asia makes the shift from manufacturing to digital services. Asian workers and institutions are affected by this rapid change, but benefit more than the West due to proactive government policy, a relatively high-skilled and low-wage workforce, and newly built digital infrastructure.

INDICATORS



ADVANCED
DIGITAL
INFRASTRUCTURE



DIGITAL
SERVICE
INDUSTRIES



DEMAND FOR
OIL AND GAS



PROACTIVE
GOVERNMENT
INVOLVEMENT

NEWS HEADLINES (2025-2030)

“First ASEAN virtual work passport will facilitate calculation of virtual employment benefits.”

“America’s favourite web content now mostly from Asia.”

“Local café-style work-hubs booming as virtual workers seek to counter social isolation.”

QUESTIONS

What will be the impact of digital value chains on current international trade agreements?

How could virtual work change immigration and urbanization patterns?

Could virtual work platforms enforce a global equal pay for equal work policy?

ASIA IN DECLINE



SCENARIO

The world enters a long-term recession, possibly triggered by falling wages and prices creating a deflationary spiral in which countries respond with counterproductive policies such as protectionism and competitive currency devaluation. Asia continues to grow, but only slowly. Deflation helps reduce the impact of falling incomes. High unemployment from automation, low wages for virtual workers and unmet aspirations result in social unrest that destabilizes several states with sporadic armed conflict, especially in fragile states. A number of states become increasingly authoritarian and use surveillance tools to understand and respond to some popular concerns.

INDICATORS



RECESSION



SHARING AND
OPEN SOURCE
ECONOMY



SOCIAL
STABILITY



ADAPTIVE
AUTHORITARIANISM

NEWS HEADLINES (2025-2030)

“Factory workers in Dhaka vote for wage reduction to save jobs from automation.”

“Hong Kong’s ‘Anti-Inequality Movement’ is gaining ground in poor areas across Asia.”

“No western troops or money for ‘Arc of Instability’ initiative led by India and China.”

QUESTIONS

Will virtual workers prefer virtual currencies (like Bitcoin) to avoid taxes, tariffs and currency devaluation?

What impacts would a declining Asia have on Canada?

What would be the global impacts of a growing number of open source and radically low-cost products from Asia?

REGIONAL ASIA RISING

Rival Asian states recognize their shared interest in meeting popular expectations for continued growth and therefore collaborate to build a more integrated regional economy and jointly tackle Asian security threats. Government policies help firms and workers use their low wages (relative to the West) to best advantage in the transition to a digital economy. An emergent cosmopolitan civil society and regionally integrated private sector also drive this integration. As a result, the Asian economy grows rapidly, becoming the new global economic hub sooner than expected and Asia uses this new economic weight to pursue shared diplomatic and trade goals.

SCENARIO

INDICATORS



INTEGRATED REGIONAL ECONOMY



COLLABORATIVE POLICY DEVELOPMENT



INTERNATIONAL DIGITAL TRADE



ASIAN GLOBAL INFLUENCE

NEWS HEADLINES (2025-2030)

“Rapidly growing digital economy accounts for 70% of Asian GDP.”

“China, Japan and India hold historic first joint naval exercise in South China Sea.”

“Bilateral China-U.S. trade flows slip to third spot internationally driven by surging intra-Asia trade.”

QUESTIONS

How could the balance of power evolve, regionally and globally, if Asian governments collaborate?

As domestic demand grows and intra-Asia trade climbs, how will the West leverage Asian action on international trade issues?

What might Asian nations perceive as their primary security threats and how might those differ from the perceived threats in the West?

Will existing intellectual property rules withstand surging digital trade and universal access to additive manufacturing?

GREEN ASIA



SCENARIO

A number of key Asian countries suffer severe economic and environmental shocks and are forced to transform their economies and societies in order to meet citizen aspirations. New technologies, frugal innovation, the collaborative economy and low-cost renewable energy become key elements in this new development model. The collaborative platforms enable more economic and environmentally sustainable patterns of production and consumption. By establishing new metrics for national targets, privileging a holistic approach to growth and development, Asia becomes a leader in sustainable design and philosophy.

INDICATORS



ENVIRONMENTAL
DISASTERS



ENVIRONMENTALLY
SUSTAINABLE
GROWTH



FRUGAL
INNOVATION



CONSUMPTION

NEWS HEADLINES (2025-2030)

“China on track to meet Climate Change targets – relaxes ‘one-flight’ policy.”

“Slowing GDP growth offset by increases in National Happiness Index.”

“Bringing nature back into urban design helps coastal cities adapt to climate change.”

QUESTIONS

How might Green Asia shift global norms on energy consumption, pollution, and ecological degradation?

How might Green Asia alter international institutions on trade, finance, and development assistance to strengthen and disseminate new environmental norms and expectations?

How will countries reliant on traditional resource extraction industries adapt to Asia’s green focus?

Policy Challenges and Opportunities for Canada

A policy challenge or opportunity is an issue that current policies or institutions may not be ready or able to address. Identifying, analyzing, debating and clarifying challenges and opportunities helps develop robust policy and strategies. The rapid changes that may occur in Asia over the next 10-15 years will present Canada with a range of challenges and opportunities. This section highlights those that may be particularly surprising and unexpected.



ECONOMIC SEACHANGE

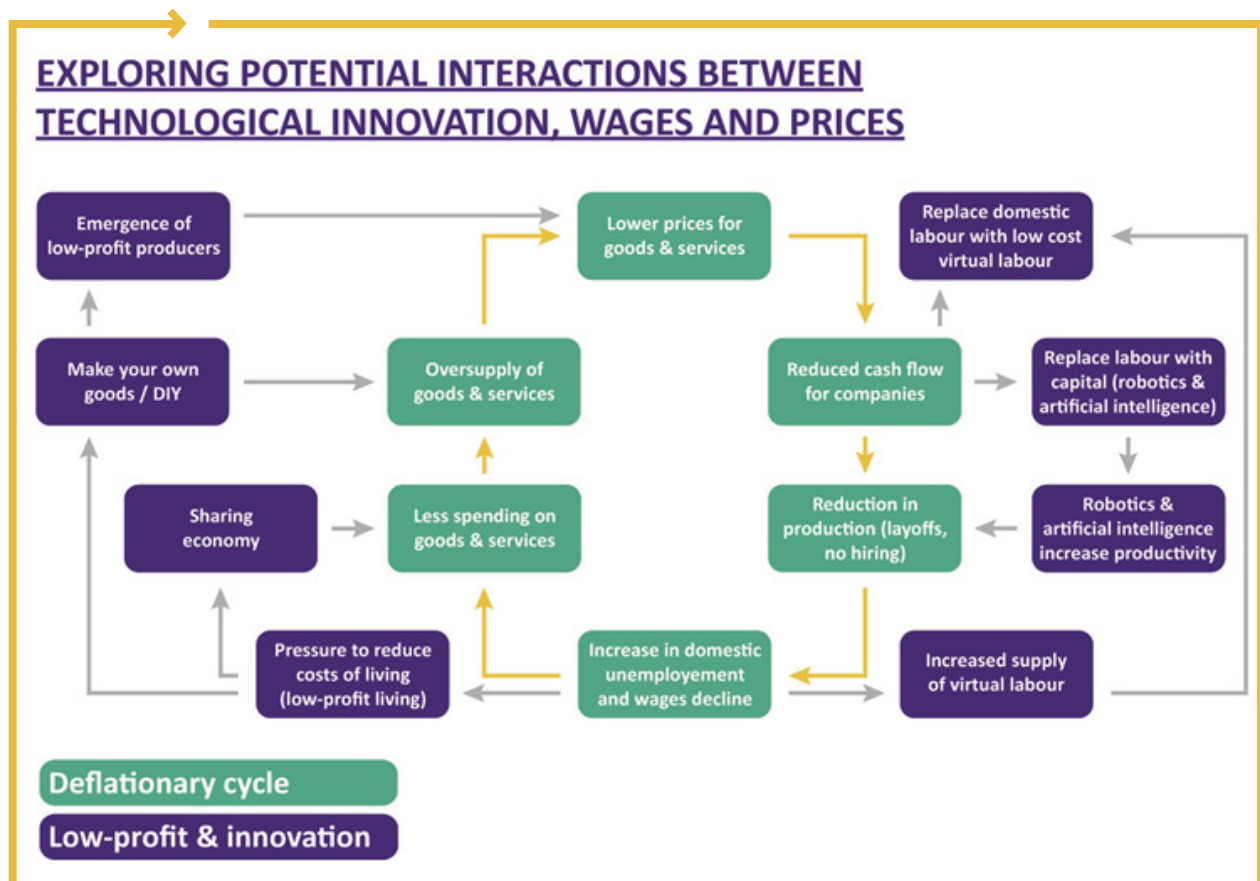
Asia's rapid embrace of new technologies and business models could accelerate the global transition to a digital economy and bring on an extended period of economic and social disruption for Canada.

Recent technological developments combined with Asia's investments in modern, fast, cheap and smart digital infrastructure, mean that much of Asia's population is poised to enter the global digital economy. This will likely increase the pace of adoption and innovation of emerging features of the digital economy such as job unbundling,

virtual work, and the collaborative economy.

Combined with rapid advances in automation and 3D printing these changes could lead to significant disruptions in prices, employment, and business models around the world. Complicating this issue is the potentially rapid pace of these changes over the next 10-15 years and the mutually reinforcing nature of these challenges (where declining wages and employment could force consumers and businesses to seek ever more cost effective goods and services — see Figure 10). From an economic perspective, surging productivity and falling prices should lead to a net benefit for society in the long run as business models and workers adjust to this new reality. However, the path to achieve this brighter future may be long and recessionary with unequal distribution of benefits. This could place

FIGURE 10



significant pressures on economic development, trade, taxation and social policies in Canada.

PREPARING FOR AN INCREASING NUMBER OF VIRTUAL WORKERS

Canadian workers may face a potential race to the bottom as the market for services moves to global online contracting platforms. Virtual work platforms

are growing rapidly as sources of employment and labour. This can bring several benefits, providing Canadians with new flexible work and entrepreneurship opportunities, while granting Canadian businesses, particularly small and medium enterprises (SMEs), enhanced productivity and access to new markets.¹¹⁷

However, virtual work also brings Canadians into more direct competition with similarly-skilled people around the world, many of whom live in areas with lower incomes and costs and may therefore be willing to perform tasks of the same quality for significantly less pay. Moreover, virtual work platforms typically lack the protections of a social safety net, health and safety standards, or clarity around intellectual property.¹¹⁸ In this context, the potential advent of hundreds of millions of digitally connected, skilled, motivated

and generally lower-wage virtual workers from Asia could drive downward pressure on wages, social safety nets and working conditions in higher wage countries such as Canada. Assisted by improvements in telepresence, automated translation, and remotely controlled robotics, competition from virtual workers could impact a wide range of previously unaffected jobs in both virtual and physical domains. Finally, this increased competition will likely come at the same time as a growing number of jobs are being further automated due to advances in robotics, AI, and other labour-saving technologies (see box).

The rise of virtual work and increased pressure from low-cost labour could require a significant rethink of existing social and labour market policies, and may stem demand for immigration. To prevent a race to the bottom, international cooperation around tax collection and social protections, work permits and qualifications may be necessary. Online platforms could become important partners in regulating their digital marketplaces. New approaches to government-funded education and entrepreneurship supports may be needed to help Canadians be successful in a more global and competitive digital economy.

SUPPORTING VIDEOS

[The World Bank: "ICTs & Jobs: Connecting People to Work"](#)
(3:56 mins)

[IPsoft: "Amelia: The First Cognitive Agent Who Understands Like a Human"](#)
(1:31 mins)

[Komatsu: "Autonomous Haulage System"](#)
(2:56 mins)

[Rethink Robotics: "Redefining Automation with Baxter"](#)
(1:37 mins)

PREPARING FOR THE RISE OF DIGITAL TRADE

As Asia and the world increasingly shifts towards digital trade, traditional trade policy approaches may no longer be relevant or effective. A whole new world

of trade in digital goods and services is emerging and growing fast. McKinsey estimates that global online traffic across borders could increase eightfold by 2025,¹¹⁹ with Asia leading the way.¹²⁰ The potential impact of this digitization of trade is only beginning to emerge. For large corporations, digital trade increases efficiency, lowers operating costs, and facilitates tax optimization strategies. But perhaps the most dramatic change is for individual entrepreneurs and small- and medium-size firms, for whom digital trade can unlock huge new global markets. “Internet platforms are empowering these ‘micro-multinationals,’ enabling them to find customers, suppliers, funding, and talent around the world at lower cost. Digital platforms can cut the cost of exporting by 83% as compared with traditional export channels.”¹²¹ Digital trade in goods and services is likely to expand and co-evolve with the development of artificial intelligence, data analytics, sensors and the Internet of Things, and international digital services are likely to penetrate deeply into our lives and homes. In summary, the world is entering an era of intense competition and enormous opportunity. For governments the challenge is how to monitor, regulate and enforce standards in the emerging digital value chain in areas like finance, labour, health and safety. Traditional trade protections and trade liberalization agreements may become less relevant as a greater percentage of global trade is able to bypass state monitoring and control. Investment controls, taxation, regulation, anti-trust and privacy protections

may also be affected. It is possible that de facto trade liberalization is already underway in the digital economy. Canada has been successful in building ports and eliminating tariffs to prosper in the current trade regime, but may need to give more thought to preparing for the emerging era of digital trade.¹²²

ANTICIPATING A WORLD WHERE TRADITIONAL POLICY INSTRUMENTS ARE LESS EFFECTIVE

As we enter the digital era, physical borders and even the nation state will likely matter less. National borders and

the related economic, tax, health, safety and labour policies will be difficult to enforce using traditional instruments in the emerging digital world where many “workarounds” are possible. For example, imagine the challenges of enforcing a minimum wage policy. Digital work platforms allow workers and firms to work anywhere. In a virtual project with workers in several countries, whose rules apply? What is the enforcement mechanism? Solving this kind of problem may require international cooperation as well as new partnerships with global corporations, not-for-profit organizations and civil society. For instance, governments could collectively set norms that other actors monitor and enforce. Virtual work platforms could apply international compensation standards including wage floors for some tasks, coordinate online training, run health and social insurance programs and collect taxes. Tracking environmental performance and combatting cybercrime are additional challenges increasingly beyond the capability of traditional nation-state approaches. Regardless of the domain, policy makers will need to explore how their instruments and policies would fare in a global digital economy.

ANTICIPATING THE DECLINING DEMAND FOR OIL

Lower than expected demand for petroleum products in Asia could contribute to unexpected weakness in the global crude oil market.²³ Low-cost oil producers may not curtail supply to increase prices because they will be competing to maintain their respective shares of a diminishing market, seeking to maximize the extraction of their reserves before oil is replaced as a predominant energy source. As a relatively high-cost producer, Canada may find it difficult to compete leading to a loss of tax and royalty revenues (impacting fiscal budgets) and decreased investment in the petroleum sector (impacting employment and increasing the risk of public investment in petroleum related assets). Governments may also need to ensure adequate safeguards are in place to address decommissioning and remediation of extraction sites and infrastructure if companies exit the sector due to low profit margins.

PREPARING FOR THE (EVENTUAL) TRANSITION TO A LOW-CARBON ECONOMY

Canadian goods and services, including primary energy and natural resources, may face trade restrictions or challenges based on their carbon content. As Asia's energy mix shifts towards low carbon, governments may seek to erect barriers to protect their markets from higher carbon content imports. Alternatively, or simultaneously, they may challenge trade and non-trade measures that are seen as protecting high-carbon sectors in developed world economies. Non-trade measures could also be implemented including

requirements for Canadian exporters to disclose carbon emissions/footprint information to maintain access to Asian markets. Government to government intervention may be ineffective if carbon footprints are used to inform individual or corporate purchasing decisions that discriminate between alternative suppliers throughout the value chain rather than as the basis for government implemented trade restrictive measures. Asian countries or trade blocks may see an economic or competitive advantage in promoting carbon footprinting as a means of positive discrimination for its exports or for excluding imports from economies with higher carbon footprints in their energy mix. If there is strong demand for carbon content reporting from Asia's emerging middle class, it could become a basic requirement of doing business in Asia and potentially lead to Asian methods for calculating carbon content becoming the global standards.

PREPARING FOR THE RISE OF ASIAN INSTITUTIONS

There is a closing window of opportunity for Canada to influence Asia's regional architecture before it begins redefining global norms and practices. Some Asian agreements — like the proposed Regional Comprehensive Economic Partnership, for instance — already exclude Canada. Furthermore, the absence of a multilateral framework guiding Asia's trade negotiations could force Canada to navigate an environment dominated by “hub-and-spoke” configurations, where bigger players like China and the U.S. set the tone and scope of collective negotiations. Without greater engagement in the region, Canada risks falling behind other middle powers. Canada has an opportunity to

SUPPORTING VIDEO

[Center for Strategic and International Studies: “Study of South Korea as a Global Power”](#)

(5:04 mins)

leverage its niche capabilities in resource management, financial services, governance, environmental protection, and supply chain resilience, to gain influence and protect its interests in Asia. Providing leadership on complex governance matters such as the establishment of rights and protections for virtual workers might afford Canada greater access to Asia’s emerging institutional architecture.

REDESIGNING SECURITY POLICY AROUND NEXT GENERATION THREATS

By increasing the destructive power of individuals and non-state actors, emerging technologies may alter the nature of warfare and insecurity in Asia and beyond, forcing Canada to rethink its defensive, offensive, and deterrent strategies and policies. The breadth and scope of emerging disruptive technologies (e.g. bio-engineering, nano-technology, synthetic biology, robotics, anti-satellite and space weaponry, and digital platforms) may dramatically reduce the utility of traditional weapons platforms and defensive strategies in protecting Canadian national and economic interests. Improving cyber defence, for instance, may require building nimble capacities better able to detect breaches in digital security, attribute sources of attack, minimize damage, and mount

proportional retaliatory strikes. Canada’s security partnerships may also have to better incorporate digital defence into their alliance structures and doctrines. Communicating defensive and offensive digital capabilities may further deter cyber aggression. Cyber-espionage may likewise become a growing source of tension between rival states, complicating the degree of collaboration between the U.S., China, India and other major powers that may be needed to ensure the

SUPPORTING VIDEOS

[Sydney Morning Herald: “Taiwan bombarded by cyber-attacks”](#)

(1:58 mins)

[Channel NewsAsia: “Cyber Security Agency will spur ‘pro-active’ security-first mindset among firms”](#)

(2:00 mins)

viability, growth, and stability of the global digital economy. Beyond cyberspace, preventative self-defense could incorporate the disruptive nature of next generation technologies into strategies for addressing novel and emerging threats to critical national assets. Canada may be compelled to re-examine the effectiveness of organizational structures originally designed for a pre-digital era.

RETHINKING STRATEGIES FOR FAILED AND FRAGILE STATES

Given the challenges in promoting peace and development in fragile states, new approaches may be required. The problems in fragile states are extraordinarily complex and costly. In this context development is an incremental process of ensuring security while supporting institutional and civil society development and encouraging economic activity. A recent OECD Development Assistance Committee [report on fragile states](#) highlights the tight linkage between poverty and fragility. One of the biggest challenges to long term stability is to help the poorest people build viable economic activity amid the chaos. Inexpensive emerging technologies could be a game changer in developing local strategies to deliver energy, education, health and opening direct access to the emerging digital economy. China's "New Silk Road" and other continental infrastructure projects may provide further opportunities to join the regional economy. The issue will be on whose terms and at what cost the fragile states agree to join. Overall, there is a need and an opportunity to use new tools and develop new strategies to work with citizens in failed and fragile states to support them in addressing overwhelming problems in more effective ways. Canada could make a useful contribution to this problem while building skills and expertise that are relevant in promoting economic development and low cost services at home.

ADAPTING TO ADAPTIVE AUTHORITARIANISM

With enhanced digital capacity to listen, analyze, and respond to public demands, highly centralized and single party governments may emerge as viable models for growth and stability.

Data analytics and AI will allow states to survey popular concerns without the need to consult citizens directly and offer the potential to reduce corruption and improve transparency. Recent events have reframed internet censorship¹²⁴ and [monitoring](#)¹²⁵ as tools used by democracies and authoritarian regimes alike, legitimizing the use of such strategies. Some authoritarian states may prove better prepared to capitalize on these new tools. The possibility that debate and stalemate over complex policy choices could paralyze multi-party democratic states would further highlight the dexterity of alternative models. The ideal of democracy as the most effective form of government may fade. This could lead to situations in international fora where authoritarian states are proposing more rational, far-sighted solutions than stalemated or short-sighted democracies. The perceived legitimacy and effectiveness of adaptive authoritarian regimes could cause Canada to rethink some of its strategies and partnerships.

LEARNING FROM AND ADAPTING TO NEW ASIAN POLICY MODELS

Innovative Asian social policy may become a leading model for others to imitate and even inspire new international standards. India's new IP

regulation strikes a balance between the demands of pharmaceutical companies and the public health needs of poorer populations.¹²⁶ Similar

regulation is being considered by developing countries across the globe. Norms and standards from Asia are likely to frame certain issues in a manner that may be at odds with Canadian values. While westerners today might scorn the encroachment of a “nanny state”, as Asian governments address similar policy problems with a different regard for collective versus individual interests, solutions from the East might grow more influential. Should Canadians face similar challenges to those addressed in Asia, voters may welcome new approaches to social policy previously considered unsuited to Canadian values. Canadian businesses could profit from these opportunities, by actively participating in shaping a wave of change in Asia which will eventually impact Canadian society.

favourable to Asian countries and economies or more compatible with Asian tastes and values.

SUPPORTING VIDEO

[Big Think: “Kishore Mahbubani: Is the West Afraid of a Rising Asia?”](#)

(4:09 mins)

WELCOMING ASIA'S GROWING CONFIDENCE AND EXPANDING INFLUENCE

As Asia rises, a fundamental change in how Asia views itself, and how the rest of the world views Asia, may take place.

This could lead to different choices and behaviours at many levels within Asia, from where parents want their children to study in school, to choice of consumer brands to how Asia projects itself on the world stage. Asia’s expanding influence may also give Asia a new opportunity to reframe success along Asian lines, with a rediscovery and flourishing of Asian practices and cultural exports shaping global norms and values.¹²⁷ Canada might see a decline or return home of Asian talent residing in Canada, while the Canadian-born may also be drawn to this new global centre in greater numbers. New definitions of sustainability, labour standards or human rights may emerge, more

Conclusion: Credible Assumptions

In the final step of the *Horizons Foresight Method*, commonly held assumptions identified at the start are tested against the scenarios and other findings to identify credible assumptions that appear more robust across a range of futures.

This Future of Asia foresight study began by listing some commonly held assumptions that consciously or unconsciously shape our thinking about the expected future for Asia. The study then identified a number of insights about plausible disruptive changes that could alter Asia's expected future. The scenarios explored how these disruptive changes could combine and interact to create surprises, helping readers to better visualize plausible alternative futures. Next, the changes explored in the insights and scenarios were used to identify a number of potential policy challenges and opportunities for Canada — issues that current policies and institutions may not be ready to address.

Finally, and by way of conclusion, the commonly held assumptions identified at the beginning are tested and, where necessary, replaced with more credible alternative assumptions. These alternative credible assumptions — presented in the right-hand column of the table below — appear to be more robust across a range of Asia's possible futures. They can be useful when developing or evaluating vision, strategy, policy and programs in Canada.



COMMONLY HELD ASSUMPTIONS IN 2015	CREDIBLE ASSUMPTIONS LOOKING FORWARD
Asia's economies will grow and become the centre of gravity and the driver of growth in the global economy.	A range of trajectories for Asian economies are possible. Asia is expected to grow, but growth could be uneven and weaker than expected due to protectionism, political instability or economic mismanagement.
The further integration of Asia in the global economy will continue smoothly.	As Asia and the world make the transition to a global digital economy, an extended period of economic and social disruption is possible. Significant employment disruption driven by new technologies, falling wages driven by job unbundling and radically evolving business models could drive change at a pace and scale beyond the capacity of governments to mount an effective response.
Asia will have a larger middle class than the West.	Asia will likely have a larger middle class than the West, however a significant new source of demand for innovative, frugal goods and services will be the 2.4 billion "emerging consumers" with incomes between US\$ 10,000 and US\$ 20,000. This could spur significant frugal innovation that may drive down global prices for many goods and services, with both beneficial and disruptive impacts.
Competition from lower-cost Asian labour is likely to slow in coming decades as wages rise in Asia.	Competition from lower-cost Asian labour could increase significantly. Unbundling of work into discrete tasks, combined with advances in telepresence, artificial intelligence, additive manufacturing and robotics could facilitate hundreds of millions of Asians to compete in an increasingly globalized digital economy, directly impacting a large number of previously unaffected low-and high-skill jobs. Asia's comparatively low wages could put downward pressure on wages and employment levels in the West.
Trade liberalization will reduce barriers and expand trade flows.	Trade liberalization is likely to occur, but not necessarily through formal trade agreements. The growing digitization of the global economy may limit the effectiveness of traditional policy tools, resulting in de facto trade liberalization.

COMMONLY HELD ASSUMPTIONS IN 2015	CREDIBLE ASSUMPTIONS LOOKING FORWARD
<p>Most government policy instruments will remain relevant and effective in the years ahead.</p>	<p>As we enter the digital era, nation states may find traditional policy instruments are less effective and that new instruments and greater international cooperation may be required to achieve policy objectives. It is likely that economic, tax, health, safety and labour policies will be difficult to develop and enforce using traditional instruments in the emerging digital economy where many “workarounds” are possible.</p>
<p>Asia’s demand for fossil fuels will continue to grow over the next 10-15 years.</p>	<p>Asia’s demand for fossil fuels could peak earlier and decline faster than predicted, leading to a softening of global demand. Emerging technologies such as electric vehicles and behavioural shifts such as virtual work may reduce the demand for oil for transportation. Low-cost oil producers may not curtail supply to increase prices in order to maintain their share of a diminishing market, seeking to maximize the extraction of their reserves before oil is replaced as a predominant energy source.</p>
<p>Despite growing concerns over pollution, economic growth will continue to trump environmental concerns in Asia.</p>	<p>Asian governments are likely to take stronger action to address environmental issues, focusing first on urban air pollution from vehicles and fossil fuelled electricity production. Electrification of Asia’s increasingly digitally-based economies with renewable energy sources could reduce the need for trade-offs between increasing energy for economic development and reducing greenhouse gas emissions. Asian countries could emerge as leaders on climate change leveraging competitive advantages in low carbon technologies into global market share.</p>
<p>Intense rivalry among Asian powers will prevent significant economic or political integration in the region.</p>	<p>Asian countries could develop robust regional institutions that facilitate deeper economic, diplomatic, and possibly security cooperation. Effective Asian regional institutions could promote peace and prosperity in the region and play a more influential and potentially disruptive role in international negotiations. As cooperation expands, the U.S. may find it increasingly costly and difficult to maintain its current preeminent position in the region.</p>

COMMONLY HELD ASSUMPTIONS IN 2015	CREDIBLE ASSUMPTIONS LOOKING FORWARD
<p>Asia's security institutions are prepared to address security threats and emerging challenges.</p>	<p>Overlapping networked relationships among non-state actors and the proliferation of disruptive technologies could generate new security gaps in Asia and the West. The ability of sophisticated non-state actors to acquire advanced digital, nano and bio technologies enables novel forms of violence, armed conflict, and political disruption. These risks could cascade and converge within and beyond Asia in ways that are hard for siloed security services to anticipate and address. State-influenced businesses with expertise and access to new technologies could also play potent and disruptive roles.</p>
<p>A growing Asian middle class will pressure their governments to become more democratic.</p>	<p>Authoritarian but responsive forms of governance could emerge as sustainable alternatives to democracy. Highly centralized and/or authoritarian regimes could use online tools to engage, respond and serve their citizens without ceding power. Evolving governance approaches and social media monitoring could redefine citizen participation in governance, potentially introducing viable new models.</p>
<p>As Asian societies rapidly urbanize and further integrate into the global economy, they will be torn between modern "western" values and traditional "Asian" values.</p>	<p>Asia could define its own interpretation of modernity, creating a new cultural exchange with the West. A modernized and more confident Asia (with a greater online presence) could expand the influence of Asian worldviews throughout the globe.</p>



Next Steps

Dialogue and Deepening the Reflection

This next step in the process is largely up to you. The statements about credible assumptions, insights about change and emerging policy challenges and opportunities in this study provide readers with the means to push the exploration even further. One way to use this information is to conduct your own thought experiments, individually or in a group. Identify a few of the statements that are relevant to your organization, responsibilities, expertise or interests. Take each statement, one at a time, and imagine what would change if it were true. (Influence mapping is a simple foresight tool that can help with this task). Is your organization prepared for these changes? What would a more robust policy or program look like?

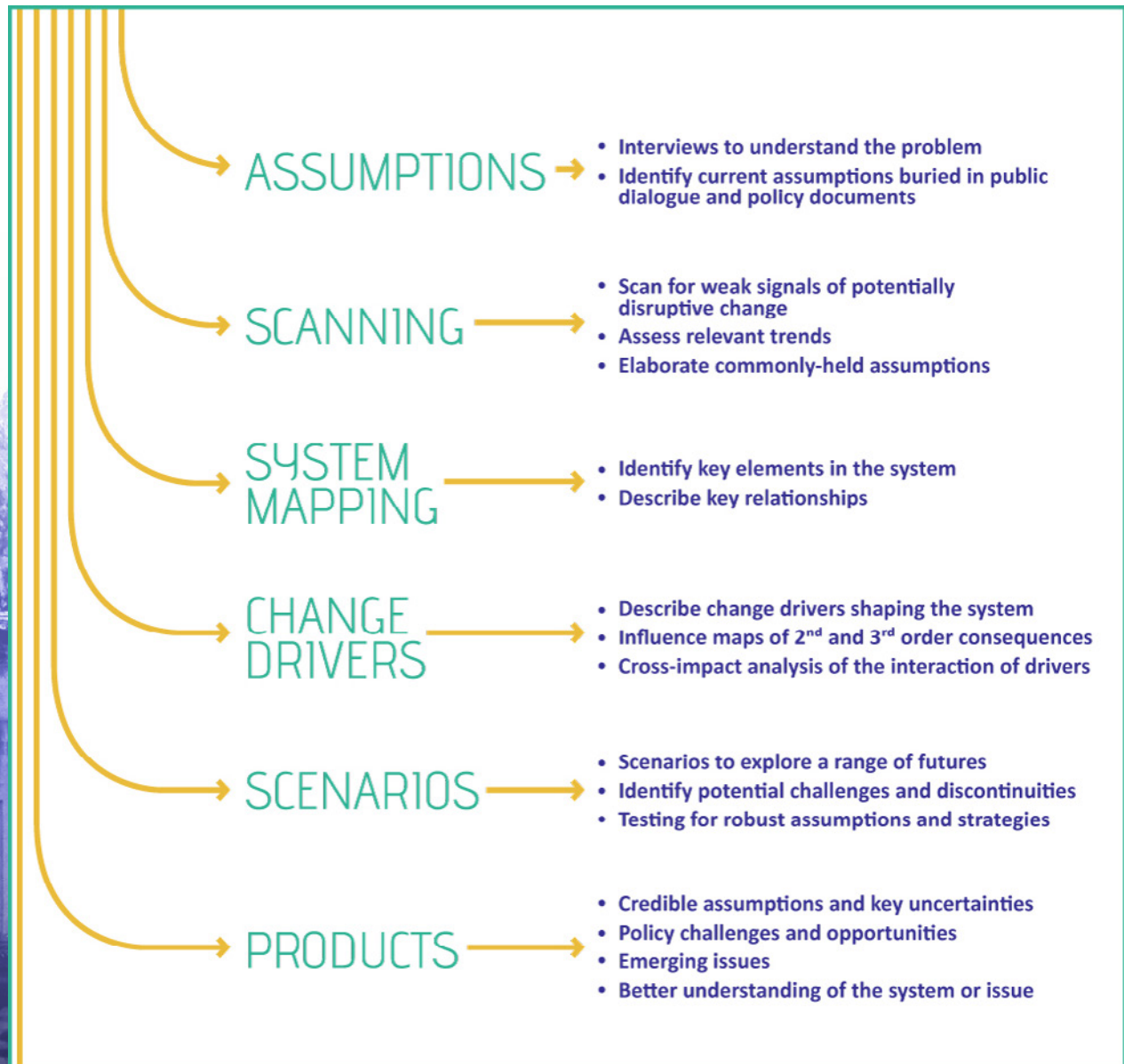
Thinking about the range of plausible futures and not just the expected future is the best way for Canada to prepare for the changes that lie ahead.



Appendix 1

Horizons Foresight Method

HORIZONS FORESIGHT METHOD



Process Description

OVERVIEW

From May to December 2014, Horizons led and facilitated a collaborative foresight study on the Future of Asia that helped build scanning and foresight literacy and capacity within the Canadian federal public service. The study involved the creation of interdepartmental “clusters”, one for each of four domains: economic, social, energy, and geostrategic. Each cluster consisted of 10–15 participants who were engaged in the process through a set of half and full-day workshops over the course of eight months.

SCANNING AND FORESIGHT RESEARCH PHASES

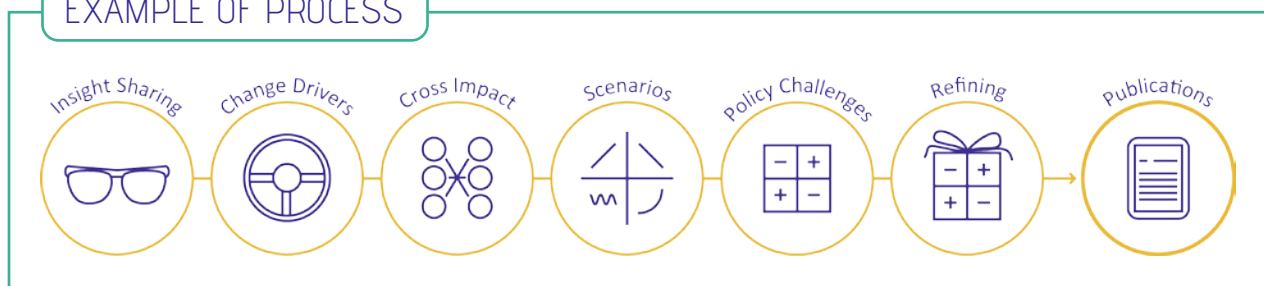
The Future of Asia foresight study had two distinct phases: the scanning phase (May–August 2014) and the foresight phase (September–December 2014). The purpose of the scanning phase was to explore weak signals (e.g. signs that a significant change is starting or that could be underway) in the four broad domains. Current assumptions embedded in Canadian policy as it pertains to Asia were also initially identified, which provided a sense of the expected future.

During the foresight phase (from September–December 2014), the interdepartmental clusters explored change drivers, plausible scenarios and

potential policy challenges and opportunities. Cluster groups had a chance to both discuss change drivers and scenarios within their domain areas, as well as interaction across domains. This analysis produced additional insights on emerging changes.

During both phases, participants were exposed to presentations and interviews with leading experts on Asia to supplement their own scanning, analysis and thinking. Horizons’ collaborative online platform, Jive, was used to share weak signals, develop insights, and comment and edit one another’s work.

EXAMPLE OF PROCESS



WRITE-UP PHASE AND PRODUCTS

A final writing phase (December 2014-February 2015) ensued, where four cluster studies were produced to provide a domain specific exploration of plausible disruptive changes in Asia and potential implications. These four intensive studies then fed in to the overarching MetaScan that highlights the key findings and explores interactions between the four domains.

OUTCOMES

The Future of Asia foresight study allowed participants to explore the changes taking shape in Asia and their potential implications for Canada over the next 10-15 years in the economic, social, energy, and geostrategic domains. At the same time, the study allowed Horizons to help build scanning and foresight capacity across a number of federal organizations through a learning-by-doing process. Participants also developed a deeper understanding of Asia and built “Asian literacy” at a time when this could be strategically valuable.





Appendix 2

Glossary of Key Terms

TERMS

DESCRIPTIONS

3D Printing or Additive Manufacturing

- A group of technologies that create three-dimensional components or products through the addition of materials (typically layer by layer). Depending on the type of technology, a range of materials (i.e. plastics, steel, stainless steel, titanium, ceramic, porcelain, concrete, and even living cells) can be used for additive manufacturing. Industrial applications are increasingly widespread and include aerospace, health care, automotive, construction, energy, defense, computer and apparel.¹²⁸

Adaptive Authoritarianism

- The capability of authoritarian governments to use social media monitoring, data analytics, surveillance and sensors to understand and respond to citizen concerns to maintain and project legitimacy.

Artificial Intelligence (AI)

- At its most basic, the capability of a machine to imitate intelligent human behaviour to complete tasks typically undertaken by humans. Long term, researchers hope to achieve social intelligence (understanding emotions and social skills), creativity and general intelligence (problem solving abilities superior to humans).¹²⁹

Assumptions

- One of the main products of foresight is to identify credible assumptions that are robust across a range of futures to help inform research, policy development and decision-making. We look at two kinds of assumptions. At the start of a project, we try to identify the 'current assumptions' that are buried in current policy and dialogue. At the end of a project we test the current assumptions against the scenarios to identify 'credible assumptions' that appear to be robust across a range of futures.

Carbon Footprint

- A measure of the total of greenhouse gas emissions caused by an organization, industry, institution, product, service, technology or person over a specific period of time or life cycle.

Change Driver

- The cause of significant change in the system under study. Change drivers are often the focus of environmental scans and key elements in many foresight processes.

Collaborative Economy

- Also commonly referred to as the Sharing Economy, the Collaborative Economy typically uses technologies such as the Internet, mobile smart devices and AI to enable people to more easily connect, trade, share and collaborate in order to achieve a more efficient use of goods, skills and services. It depends on people being able to communicate and share information, making it possible to generate trust through meaningful interactions.¹³⁰ For additional definitions of this evolving concept see, for example, "[the sharing economy lacks a shared definition](#)".¹³¹

Collectivist Values

- A social outlook that prioritizes the collective and the interdependence of humans within a society over the individual.

Data Analytics (Big Data)

- The analysis of raw digital data to draw insight. As the amount of digital information generated by people, sensors and the Internet of Things grows at a rapid pace, new data analytics tools (artificial intelligence and growing computing power at falling costs) have the potential of delivering ever more insight.

Decentralized Energy

- Electrical energy produced close to where it will be used rather than being provided by a large central power plant and transmitted over long distances using national or state electrical grids.

E-learning

- The use of digital technologies for learning and teaching.

Emerging Consumer Class

- An income group earning between \$9,500 and \$19,500/year as measured by purchasing power parity. By 2030, it is forecasted that, with approximately 2.4 billion members in Asia, this group will represent the largest consumer market (by population) in the world.

Energy Mix

- The relative share of different energy sources used by an entity, usually in reference to a nation, region or continent. It can also be applied to sectors such as electricity and transportation. Energy mix can be expressed in different metrics such as the relative share of primary energy source — e.g. oil, coal, nuclear, hydroelectricity, wind, solar — or in more aggregated terms such as the relative share of renewable sources compared to non-renewable sources.

Energy Security

- The capacity for a nation to ensure reliable and uninterrupted energy supplies at an affordable price.
-

Freemium	<ul style="list-style-type: none"> ➤ A business model in which a product is provided for free to a large group of users and premium version of the product is sold to a smaller fraction of this user base.
Frugal Innovation	<ul style="list-style-type: none"> ➤ Innovation that uses design thinking and the latest technologies to radically reduce costs and innovate in areas as diverse as consumer goods, health care and education.
Hard Power	<ul style="list-style-type: none"> ➤ The capability to initiate, defeat, or deter attacks, and to influence the behaviour of opponents more broadly, by using air, land, maritime, and cyber-based weapons and threats, intelligence and communications assets, and logistical capabilities.
Human Flesh Search	<ul style="list-style-type: none"> ➤ A massive human collaboration, facilitated by social media platforms, to identify an individual by flagging their presence in multiple digital images. Once identified, the individual's information is made public by the crowd. These searches have been used to recreate events in order to prove the innocence or guilt of individuals as well as to humiliate and shame victims of the search.
Hybrid Governance Frameworks	<ul style="list-style-type: none"> ➤ New policy-making arrangements and strategic management tools that bring technical expertise and contrasting perspectives from the public and private sectors together in order to correct institutional deficits and resolve complex policy issues that transcend geographic boundaries and political jurisdictions.
Influence Map	<ul style="list-style-type: none"> ➤ A visual tool for mapping plausible cause and effect chains into the future. It helps one to explore, discuss and assess the possible future impacts of change drivers in an orderly way.
Insight	<ul style="list-style-type: none"> ➤ Builds understanding of how an issue or system may evolve and what the consequences might be. Credible insights are the 'evidence' that help one to reason about the future.
Integrated Translation Functions	<ul style="list-style-type: none"> ➤ An automatic language translation function integrated into existing software, or Internet platforms. These functions are made possible through artificial intelligence.

-
- Internet of Things or Internet of Everything** > The virtual connectivity of individuals, groups, governments, and technical devices through unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. This will enable new services and capabilities for users, manufacturers and service providers.¹³²
- Job Unbundling** > Traditional permanent, full time employment is increasingly being replaced by part-time jobs or contracts. The job unbundling theory suggests that this process will continue as contracts are further decomposed to very short-term projects, tasks and micro-tasks. Eventually, jobs with repetitive components will be replaced by a hybrid model where a person working in a task-based environment will handle the very small number of exceptions that artificial intelligence cannot process.
- Knowing Society** > A society that has integrated digital technologies into nearly all aspects of life, allowing for real-time data and artificial intelligence to create high situational awareness and amplified human capacity, such that traditional careers and customs may evolve or be replaced.
- Low-Carbon Economy** > Refers to an economy with minimal release of greenhouse gas emissions into the biosphere.
- Low-Carbon Technologies** > Refers to technologies that generate minimal greenhouse gas emissions while producing or consuming power.
- Low-Cost Oil Producer** > Refers to a country that incurs lower costs in extracting and bringing crude oil to the market relative to other oil producing countries. Costs vary between oil-producing countries due to numerous factors such as variations in the grade of petroleum deposits from which the crude oil is produced, the geographical and geological location of the petroleum deposits, their proximity and access to markets and differences in business environments.
-

Low Rent Strategy

- Economic rent is the additional amount paid for a product (e.g. good, service, or input) that is due to scarcity or exclusivity, including that created by an officially conferred privilege such as government-enforced licenses, patents, production quotas, etc. A low rent economic strategy seeks to offer the product without this additional cost by limiting or otherwise circumventing the officially conferred privilege.¹³³ Examples are the ride-sharing service Uber's circumvention of limited taxi licenses or India's elimination of patent protection for some pharmaceutical products. Firms may also choose not to maximize rents (e.g. on patents that they own) in order to offer low prices and seek a long term market advantage.

Medical Tourism

- Traveling abroad in order to obtain superior or more affordable medical treatment, or to receive procedures or treatments that are unavailable in a patient's home country.

Mental Models

- Everyone builds mental models about the way the world works from the knowledge, experience, images and stories which we carry in our minds. We use these mental models to run 'movies' to explore alternatives and to help us make decisions. This capacity to visualize and run simulations is an under-utilized resource. A variety of imaging exercises can help us tap into the power of this resource in a structured way.

Micro-multinational

- Smaller or early stage companies that operate in multiple countries without the scale or financial resources typically found in larger, more traditional multinational corporations.

Non-traditional Security Threats

- A broad spectrum of increasingly interconnected security threats including but not limited to the following: low-intensity armed conflict, insurgency, terrorism, and violent political radicalization; endemic corruption, identity theft, and the emerging nexus between terrorism and crime; human, wildlife, and resource smuggling and trafficking; extreme weather events, climate-induced migration, resource scarcity, and health pandemics; cyber-espionage, -crime, and -war.

Open Source

- A development model that utilizes free license to promote universal access to a product's design or blueprint and universal redistribution of both the original design or blueprint or any subsequent modifications made by anyone. It is often seen as related to software development but has growing relevance in other fields.¹³⁴

-
- Policy Challenge** > A challenge which current policies and institutions do not appear to be ready to address. One of the major products of our foresight work is to identify significant policy challenges that lie ahead. In identifying these challenges, opportunities often emerge.
- Purchasing Power Parity** > An economic theory that estimates the amount of adjustment needed on exchange rates between countries in order for the exchange to be equivalent to each currency's purchasing power.¹³⁵
- Renewable Energy** > Refers to energy that comes from resources which are naturally replenished on a human timescale such as sunlight, wind, water, tides, waves, biomass and geothermal heat.
- Rules-based Governance Systems** > The orderly management and regulation of diplomatic arrangements enforced through impartial legal mechanisms, or resulting from cross-border transactions conducted on the basis of personal and informal diplomatic agreements.
- Self-expression Values** > "Self-expression values give high priority to environmental protection, tolerance of diversity and rising demands for participation in decision making in economic and political life." — The World Value Survey Culture Map¹³⁶
- Scenario** > A story about the future. There are many types of scenarios and methods to develop scenarios. All of them explore multiple, plausible futures.
- Smart Censorship** > The application of censorship in a selective and dynamic fashion. Reducing the amount of censored information to the minimum required to maintain stability, legitimacy and control. One example is the censorship of words or ideas exclusively during a time of year when a particular idea is most likely to incite protests or dissent.
- Soft Power** > The relative ability of state and non-state actors to exercise real and symbolic authority in order to influence an actor's behaviour by attracting or coopting it, rather than by coercing or incentivizing it.
- Super Grid** > A regional electrical transmission network that permits high volumes of electricity to be transmitted between nations.
-

Telepresence or Virtual Presence

- A set of technologies that allow a person to feel as if they were present, to give the appearance of being present, or to have an effect, via video image and/or telerobotics, at a place other than their true physical location.¹³⁷

Telerobotics

- An area of robotics concerned with the use of robots that are controlled remotely using wireless technology.

Trade Restrictive Measures

- Also known as protectionist policies, trade restrictive measures are actions undertaken by governments with the aim of reducing imports of targeted goods and services. Examples include the imposition of tariffs or quotas for imported goods or requirements to meet standards that are not imposed on domestic providers of the similar goods or services.

Trend

- A continuous change that is evident from quantitative data. Trend data can help us understand the baseline or expected future.

Weak Signal

- A sign that a significant change is starting or that it could be underway. Weak signals challenge our mental model. We have an ‘ah ha’ moment because it does not fit our understanding. Weak signals are found by reading, interviews and dialogue.

Web 2.0

- The second generation of the World Wide Web which allows users to generate and share content through participation and collaboration. The first generation of the Internet mainly had content which was generated by website administrators.

Web 3.0

- The third generation of the World Wide Web is defined by platforms and applications which utilize artificial intelligence and semantics to provide users with a seemingly intelligent interface. This ‘intelligent web’ automates many cognitive tasks, delivering a more intuitive experience and potentially enabling users to be more productive.



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Technical note: The economic projections stem from the OECD Prospects to 2060, <http://stats.oecd.org/economicoutlook/stories/home.xml> for OECD countries at 2030, with regional regressions based on local income rank and projected growth rates from World Bank data for countries not independently modelled in the OECD Prospects data set. Each country's population is modelled at 2015 and 2030 using a lognormal income distribution with World Bank household correction, using after-tax and transfer household Gini coefficients based on the most recent World Bank data available. The numbers of people living in households with after-tax-and-transfer incomes higher than \$19500/capita/yr by PPP (the "global consumer class"); and between \$9500 and \$19500/capita/yr by PPP (the "emerging consumer class") are tallied and reported on in the infographic and report. These cutoffs correspond closely to the most recent World Bank definitions for a "high income" and "mid-high income" country. The Gini coefficients for inequality are held stationary in time for the default scenario, save for a modest increase through 2030 due to returns increasingly going to a highly-skilled subset of the population, based on Braconier and Ruiz-Valenzuela's work at the OECD, which was corrected for post-tax-and-transfer in the regions with higher tax and transfer rates.

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