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Gary A. Bolles

The Digital Work Economy & Our Human Future

PUBLIC SERVICE 4.0: WHAT MIGHT IT LOOK LIKE?
Peter Shergold

THE DIGITAL SOCIAL CONTRACT AND E-LEGITIMACY
Max Everest-Phillips

TRENDS AND SHIFTS IN EMPLOYMENT: SINGAPORE'S WORKFORCE
Augustin Lee

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Editorial

by **Alvin Pang**
Editor-in-Chief, ETHOS

The rapid technological advancements of our time have provoked as much anxiety as enthusiasm.

While businesses and consumers may applaud the ever increasing ease, efficiency and expanded reach that each new application offers, there are hidden costs to this galloping pace of change. Those who are in less of a position to take advantage of new developments risk being displaced or side-lined, which can breed disaffection and deepen existing socioeconomic divides. Unfortunately, the world will not slow down to allow stragglers to catch up. Nor can the public sector stand aloof from such dilemmas: as veteran public servant and our Senior Research Fellow Peter Shergold reminds us, machine learning and other advances are poised to revolutionise not just service delivery, but also the backroom analytical processes at the heart of government work (*p. 4*). In light of these shifts, practitioners have argued for a more agile approach to policymaking, not least because a timely, iterative response to emerging developments can make the difference to whether policy intentions are met (*p. 14*).

But this is not merely a matter of cracking the whip on laggard bureaucracies. Beyond speed and cost savings, governments need to take into account other factors that the market may not consider: including social cohesion, factual veracity, security issues and

privacy. Our institutions may need to be strengthened or developed to manage such concerns (*p. 26*), while allowing the benefits of technology to flow through in ways that are more conducive to human well-being (*p. 36*). Technology is not a force of nature to be weathered like a storm: paths and choices can and should be taken mindfully. The sobering prospect of workers being replaced by automation en masse is only part of the narrative. There are also opportunities to help workers find more meaningful employment, to support worker productivity and capability (both physical and cognitive), to relieve manpower shortages (especially in ageing societies), and to free up teams to offer a more attentive, human touch to clients and stakeholders (*p. 48*; *p. 80*). Indeed, these human capacities—for empathy, judgement, compassion and adaptability—may well gain more traction once machines can handle more mechanical or routine tasks. Greater imagination could be brought to bear to help realise the potential of technology to enhance rather than disrupt.

At the same time, the responsible approach would be to prepare our people for a much more complex, uncertain future in which they must learn to take charge of their individual development and career trajectories: hence initiatives such as Singapore's national SkillsFuture framework. For many, this is a significant leap to take: it is a cultural shift that ought to be managed judiciously rather than left to the vagaries of the market. On its part, Singapore's Ministry of Manpower has monitored the trends very closely and has thought through some of the emerging challenges and possible solutions that may arise as employment patterns change (*p. 56*). We should consider what structures might be

needed to protect freelancers and other workers who don't fall into traditional categories of regular employment. A balanced approach that is supportive rather than prescriptive could ensure basic securities that many employees already enjoy, while allowing evolving work arrangements to find their own level. Rather than discourage people from new modes of working, safety nets could be made more broadly accessible, for instance. Novelty always comes with risk; the experiments of the private sector often raise interesting, even game-changing possibilities, suggesting how work flexibility, service responsiveness, data insight, and inventive partnerships could result in greater public value (*p. 42*; *p. 68*).

The future of work is less about who gets to do the work, but what work is worth doing—and what tradeoffs should be made in so doing. Such questions cannot be resolved by any one sector alone: societies that can address these issues in a spirit of pragmatism, transparency, honesty and trust, will have a better shot at making the future work for them.

I hope you find this issue of Ethos, with a refreshed layout, a productive read. ■

The future of work is less about who gets to do the work, but what work is worth doing—and what tradeoffs should be made in so doing.

Public Service 4.0: WHAT MIGHT IT LOOK LIKE?

by **Peter Shergold**

Digitisation and robotic process automation will revolutionise public administration—but the outcome will depend on how we choose to use them.

Peter Shergold, Chancellor of Western Sydney University and NSW Coordinator General for Refugee Resettlement, is a Senior Research Fellow at the Civil Service College Singapore. He was formerly Secretary of the Department of the Prime Minister and Cabinet in Australia.

According to Klaus Schwab, Founder of the World Economic Forum, we "stand on the brink of a technological revolution that will fundamentally alter the way we live, work and relate to one another."[1] The Fourth Industrial Revolution will see the fusion of technologies in which the lines between the physical, digital and biological spheres are blurred. Industry 4.0 will be characterised by billions of people staying connected remotely through pervasive mobile devices, able to access vast amounts of newly created data, while assisted by capable machines.

The adoption of artificial intelligence (AI) is at an inflection point. The internet of things, fuelled by neural-based machine learning, will move from simple digitisation to a convergence of technologies. The major challenge is not technical but how to integrate robotic automation into workplace processes, decision-making and culture.

Whether this transformation will be good or bad for citizens is hotly debated. Platforms "will increasingly enable citizens to engage with governments, voice their opinions, coordinate their efforts, and even circumvent the supervision of public authorities".[2] Governments will face increasing pressure to engage with citizens whose access to information will be more immediate than ever before. Digital opportunities for democratic engagement will increase, while the organisation of protests or online political advocacy will become easier. Government open-sourcing has the potential to underpin participatory government in a data-driven society, by

The major challenge is not technical but how to integrate robotic automation into workplace processes, decision-making and culture.

allowing the public real opportunity to contribute to the development of public policy.[3] However, as jobs disappear, the governance of citizens may also become more difficult. Societies may fragment as inequality increases.

New Technologies Will Reshape Public Sector Work

Unquestionably, a new wave of disruptive automation is already transforming work. In the last century, automation saw repetitive lower-skilled factory labour progressively taken over by mechanical robots. Now it is administrative skills that are most under challenge. Much of the expertise of professionals will be demystified and their role as gatekeepers to knowledge undermined.[4] Many occupations which previously required extensive training and the exercise of judgement can already be undertaken faster, better and at lower cost by increasingly capable machine-based systems. A high proportion of these jobs are located in public services.

As the technologies of visual recognition and speech translation combine with exponential growth in data processing capability, officialdom is likely to be changed in fundamental ways. It will not just be the relatively routine but often complex tasks of data collection, clerical processing and compliance checking that will become automated. Professional skills, including risk assessment and project management, will increasingly be undertaken with greater reliability by robo-advisors.

The application of *robotic process automation* (RPA) to administrative jobs will enable significant reductions in the size of public services. Estimating that the US Federal Government could potentially save billions of dollars through automation, Deloitte concludes that "cognitive technologies will eventually fundamentally change how government works, and the changes will come much sooner than many think."[5] Similarly, the UK think tank, Reform, suggests that the UK public sector can be slashed through automation, and not just clerical back-office jobs. Sophisticated "chat bots" that conduct

MUCH OF THE **EXPERTISE** OF PROFESSIONALS WILL BE **DEMYSTIFIED** AND THEIR ROLE AS GATEKEEPERS TO KNOWLEDGE UNDERMINED.

A HIGH PROPORTION OF THESE JOBS ARE LOCATED IN PUBLIC SERVICES.

Too often, government agencies imagine the future without effectively delivering the present.

human-like conversations by text or voice will become the new frontline. "Public services" they argue, "can become the next Uber."[6]

At the basic level of the public sector workforce, change is likely to be intense. Driven by value-for-money considerations, a desire to lift productivity and an ambition to improve customer service standards, RPA can rapidly enhance the performance of public administration. AI-augmented government will be able to deploy computers to perform tasks and make decisions previously thought to require intellectual effort. They will not necessarily replicate the thinking process of human specialists.

> "I WANT PEOPLE TO USE DIGITAL PUBLIC SERVICES AS READILY AND AS CONSTANTLY AS THEY DO WHEN SHOPPING, SOCIALISING OR CHECKING BUS TIMES. BY DOING SO, WE CAN ACTUALLY CHANGE THE WAY CITIZENS INTERACT WITH US."[7]
>
> — John Manzoni,
> Chief Executive, UK Civil Service

There are dissenting voices. Some remember the false dawn of workplace automation in the early 1980s, when many observers anticipated a workless society that never came to be. Not a few are jaundiced by the disappointment of too many earlier 'e-government' initiatives and remain sceptical of rhetoric. The former Chief Executive of Australia's Digital Transformation Agency, Paul Shetler, has criticised how public service leaders tend to talk up a bold future of "big data, artificial intelligence, dancing holograms, and all that kind of stuff" yet persistently fail to deliver on the basics of customer service.[8] Too often, government agencies imagine the future without effectively

Consumer and citizen online behaviours are

DIFFERENT

A citizen in search of public services is not a shopper. Assumptions born of consumer behaviour in a competitive market economy do not readily translate into the relations between an individual and the state. There are important differences.

First, in most instances citizens do not choose to do business with government. It represents an unavoidable impost on their time. Looking online for the best value purchase can be an enjoyable experience. Submitting one's annual tax return, paying a fine for speeding, applying for a family payment, are irritating chores. Most citizens want to complete their transaction as speedily as possible, at a time and place of their convenience, with easy access to assistance if the matter turns out to be more complex than anticipated (it often does). That sense of government as a necessary burden should drive the initial application of automation and digital communication.

Assumptions born of consumer behaviour in a competitive market economy do not readily translate into the relations between an individual and the state.

Perhaps with time, perceptions might change. Citizens might be persuaded to use automated information technology to increase the range of things they actually want to do with government, such as booking a medical appointment online or reporting a pothole in the road. Making publicly-funded data available to the public under a creative commons license will allow them to use government-collected information in ways they find useful: for example, to check out house prices, peruse land titles or identify which suburbs are safest to live in.

Second, citizens appear to hold a view of privacy that is different from that of consumers. Young people, in particular, seem to be increasingly cavalier about the personal details that they put up for others to read or view online. They are remarkably sanguine about placing information about themselves on social media. In contrast, citizens remain wary of the capacity of governments to hold their confidential information securely. Public trust in governments and politicians tends to be low and declining. Citizens demand public protection of their private lives at a level that they often fail to require of each other in the world of online 'friends'. They distinguish between the perceived freedom of the market and the executive authority wielded by the state.

These important caveats may constrain the movement of automation from the private to the public realms.

delivering the present. Too frequently their application of technology simply reproduces the traditional hierarchical structure and functional demarcations of the public service.

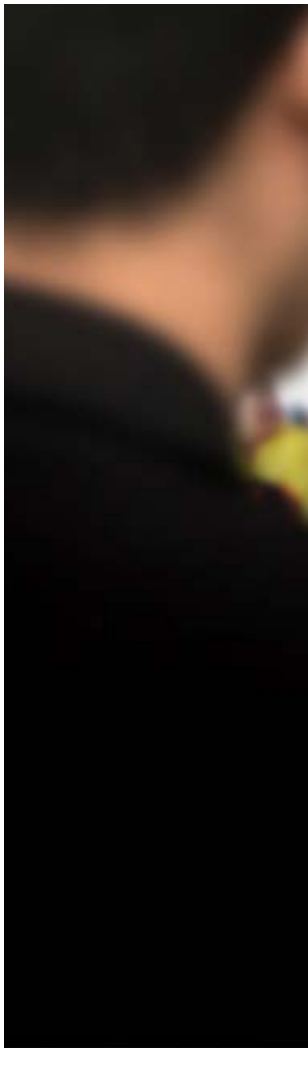
Bureaucratic Processes Lend Themselves to Automation

Much public administration is ideally suited to robotic application. Bureaucracy is a rules-based system, governed by legislative and administrative guidelines, comprising many routine procedures for decision-making. Today, these repetitive processes require public administrators to exhibit expert knowledge of complex systems and arcane criteria in order to make decisions. Tomorrow, most of these tasks will be able to be undertaken by machines. Robots will have the capacity not just to repeat processes but to discern methods of improving them. Providing information, making payments, collecting revenues, processing grant applications and enforcing regulations will increasingly be automated. So, too, will government procurement, property maintenance, payroll processes, IT diagnostics and the provision of shared services.

In most instances, robotic administrators will be able to undertake such tasks faster. Working 24 hours a day, every day of the year, backlogs will be reduced. The contingent liabilities associated with paid labour will be lowered—machines do not need recreational or medical leave (unless the IT system goes down), or complain about workplace conditions.

Public sector performance will be lifted. Quality will be improved. The robot that emulates human execution of repetitive tasks will make more accurate decisions. It is less likely to make errors or be swayed to exercise discretionary judgement in uncertain ways. Public accountability will be enhanced. It will be easier to audit every robotic action and decision. Compliance and security requirements will be consistently applied. As machine-based speeds and volumes increase, the scalability of technological innovation will increase vastly. At present, it is civil servants who provide the glue that joins together the complex network of systems, processes and rules that underpin effective public administration. In the future, it will be robots.

Computers, without explicit programming, will learn how to learn, mining unstructured information to detect patterns to anticipate events. Robots are already developing better-than-human predictive capabilities, able to identify both patterns and anomalies in huge data sets. They will be able to foresee the spread and direction of health epidemics, analyse patterns of transport use or identify the likelihood of adverse weather events. They will be able to spot irregularities that might indicate welfare fraud, insider trading, identify theft or money laundering.



Robots will have the capacity not just to repeat processes but to discern methods of improving them.

AI-Assistance will Move from the Back-Office to the Frontline

As cognitive technologies are applied—through computer vision, speech recognition, natural language processing and machine translation—robots will move from the back-office to the frontline. It's already happening. Apple's Siri and Amazon's Alexa now have public service colleagues working as voice-driven virtual androids. The US Immigration Service introduced a virtual assistant, Emma, to help answer 14 million enquiries a year. To assure privacy and confidentiality, Emma promises to delete chat logs at the end of each session.[9]

Robotic automation widens the opportunity to apply behavioural psychology to "nudge" citizens towards pro-social conduct. Machines can be programmed to engage with members of the public in different ways, learning what approaches have most positive impact. They can test responses. Whether it is persuading recalcitrant offenders to pay their fines or convincing families to live healthier lifestyles, robots can learn how to communicate in the most effective manner. They can teach us what works best with humans.

All of this has the potential to add significant value to the manifold activities of government that will continue to require a human presence. Converging technologies will allow people to work together in quite different ways. Much of the delivery of public value is already undertaken in partnership with the private sector or in collaboration with community-based organisations. Nevertheless, the institutional recruitment and training of civil servants too often remains inflexible, making it hard for employees to move in and out of public administration.

Technology will make possible more porous organisational boundaries.[10] The digital world allows skilled workers to come together from around the globe to design and operationalise particular public sector projects. In my recent report to the Australian government, *Learning from Failure*, I called this the "Hollywood model".[11] It is based upon the concept of a creative workforce bound together temporarily by a shared common interest in completing a particular task, and then dispersing. Technological connectivity will allow people to contribute to beneficial public impact, without having to commit to a lifetime career as a civil servant. Much of public service can become a "flash organisation" assembled for a particular purpose.

Much public administration is ideally suited to robotic application.

The technological future of Public Service 4.0 is already with us. Digitisation and robotic process automation will progressively transform how public administration is undertaken. How fast depends on the scale of government investment and the breadth of its imagination. But increased productivity and improved service delivery are just the starting point. Creative minds, assisted by machines, can envisage new ways of applying connective technologies to government—either to reinvigorate democratic participation or to reinforce authoritarian power. The outcome rests with humans not robots. The question is whether we can be trusted to make the right decisions. ■

Notes

1. Klaus Shwab, "The Fourth Industrial Revolution: What It Means, How to Respond", January 14, 2017, accessed November 24, 2017, https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond.

2. Shwab, "The Fourth Industrial Revolution".

3. Audrey Lobo-Pulu, "Why We Need an Open Model to Design and Evaluate Public Policy", January 10, 2017, https://opensource.com/article/17/1/government-open-source-models.

4. Richard E. Susskind and Daniel Susskind, *The Future of the Professions: How Technology will Transform the Work of Human Experts* (Oxford University Press, 2016).

5. William D. Eggers, David Schatsky and Peter Viechnicki, "How Artificial Intelligence Could Transform Government", *Deloitte Insights*, April 26, 2017, accessed November 24, 2017, https://dupress.deloitte.com/dup-us-en/focus/cognitive-technologies/artificial-intelligence-government-summary.html. See also Gary Flood, "AI to Have Huge Impact on America's Public Sector, Says Deloitte", June 1, 2017, accessed November 24, 2017, http://www.thinkdigitalpartners.com/news/2017/06/01/ai-huge-impact-americas-public-sector-says-deloitte/; Michael Chiu, James Manyika and Mehdi Miremadi, *McKinsey Quarterly*, "Where Machines Could Replace Humans—and Where They Can't (Yet)", July 2016, accessed November 24, 2017, https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet; and Tina Hallett and John Hawksworth, "What Will the 'Rise of the Robots' Mean for Public Sector Jobs?", April 6, 2017, accessed November 24, 2017, http://pwc.blogs.com/publicsectormatters/2017/04/what-will-the-rise-of-the-robots-mean-for-public-sector-jobs.html.

6. Alexander Hitchcock, Kate Laycock and Emile Sundorph, "Work in Progress. Towards a Leaner, Smarter, Public-Sector Workforce", February, 2017, accessed November 24, 2017, http://www.reform.uk/publication/work-in-progress/. See also Thomas Colson, "Robots Will Take Over 850,000 Public Service Sector Jobs in Britain by 2030", October 25, 2016, accessed November 24, 2017, https://www.businessinsider.com.au/automation-to-claim-850000-public-sector-jobs-by-2030-2016-10.

7. Quoted in Guy Kirkwood, "Opinion: The UK Government's Big Robotics Opportunity", posted by Gary Flood, March 28, 2017, accessed November 24, 2017, http://www.thinkdigitalpartners.com/news/2017/03/28/opinion-uk-governments-big-robotics-opportunity/.

8. Stephen Easton, "Paul Shetler: Forget High Tech Fantasies if You Can't Answer the Phones", August 2, 2017, accessed November 24, 2017, https://www.themandarin.com.au/category/portfolio/education/.

9. US Department of Human Services, "Meet Emma, our Virtual Assistant", updated May 17, 2017, accessed November 24, 2017, https://www.uscis.gov/emma.

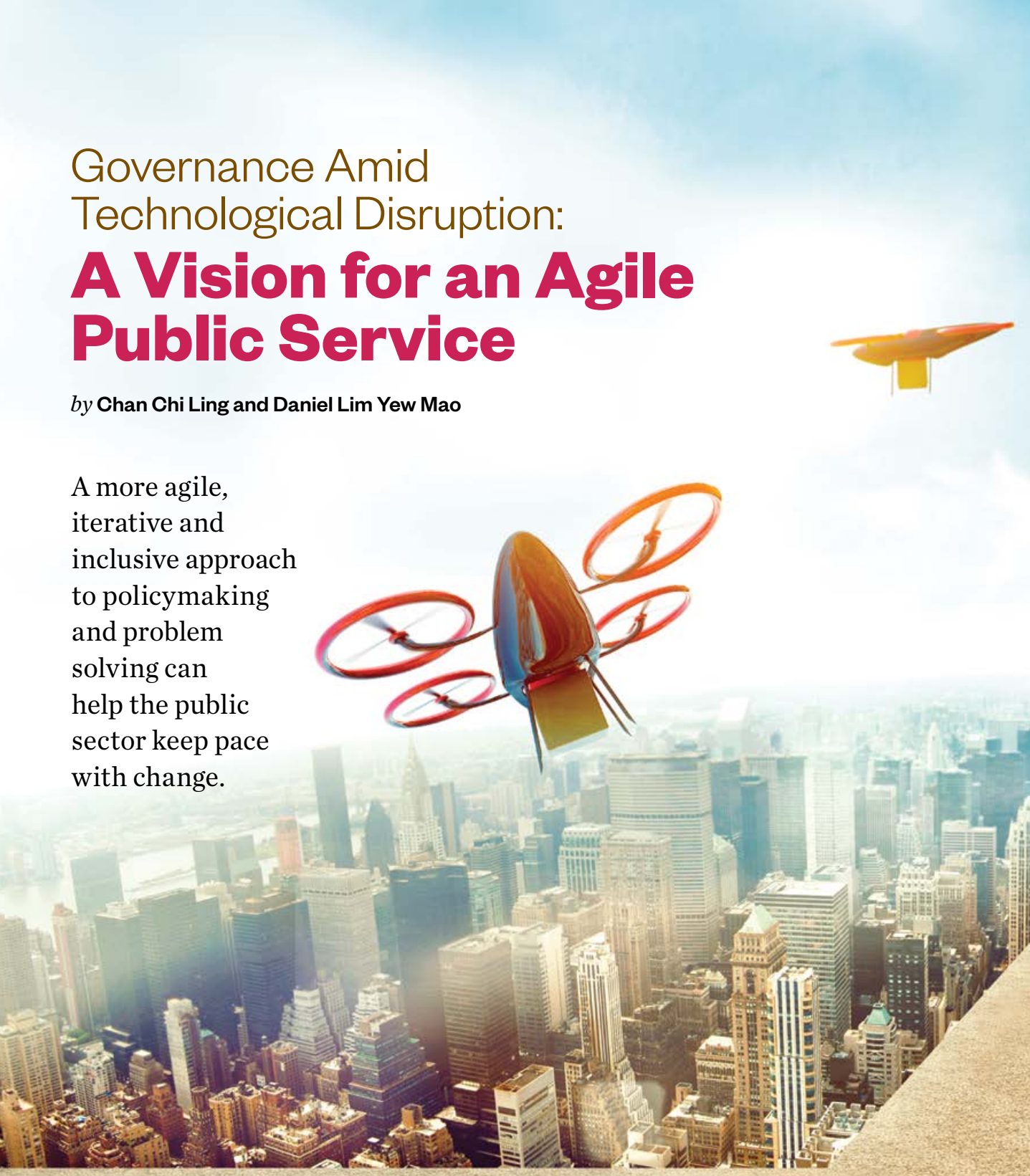
10. For instance, blockchain technology could be used to record and verify a variety of public transactions and documents, enhancing mass collaboration and accountability. Anticipated government uses of blockchain technology include identity management, document provenance, supply chain regulation and—most ambitious—automated online voting systems.

11. Peter Shergold, "Learning from Failure: Why Large Government Policy Initiatives Have Gone So Badly Wrong in the Past and How the Chances of Success in the Future Can Be Improved", updated February 5, 2016, accessed November 24, 2017, http://www.apsc.gov.au/publications-and-media/current-publications/learning-from-failure. Also see "Public Service Needs 'Hollywood Model' of Work", *Canberra Times*, February 5, 2016, accessed November 24, 2017, www. canberratimes.com.au.

Governance Amid Technological Disruption: A Vision for an Agile Public Service

by **Chan Chi Ling and Daniel Lim Yew Mao**

A more agile, iterative and inclusive approach to policymaking and problem solving can help the public sector keep pace with change.



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Will robots take our jobs? Can Artificial Intelligence (AI) be applied ethically and safely? What will happen when self-driving cars and flying drones are in widespread use? How should government regulate emerging technology without stifling innovation? As far as evidence goes, a reasonable answer to all of the above might be: *we don't really know*.[1]

We know the pace of technological advancement has accelerated significantly. But the net impact from these developments will result not from technology alone, but from its interaction with a broader set of demographic, economic, social and environmental factors. Around the world, governments are still feeling their way around these uncertainties. How should we begin to think about governance amid technological disruption?

> When policy clockspeed is out of sync with an accelerating technology clockspeed, the ability of decision-makers to process, understand, and react to the changing environment is diminished.

Clockspeeds Out of Sync

In management theory, each industry is shaped by its own *clockspeed* (akin to an evolutionary life cycle), defined as the rate at which it introduces new products, processes, and organisational structures.[2] We adapt this definition to the public policy context, and introduce three clockspeed concepts for understanding governance in a Volatile, Uncertain, Complex, and Ambiguous (VUCA) environment: technology, policy, and risk.

Technology clockspeed is the rate at which technological innovation reaches mass adoption in a specific domain.[3] It has been accelerating since the First Industrial Revolution began 200 years ago, and looks set to continue as we enter the Fourth Industrial Revolution.[4]

Meanwhile, *policy clockspeed*—the duration of a policy cycle and policy response time—has not kept pace in some domains.[5] In some cases, this has resulted in government action lagging so far behind as to render it irrelevant: the US Federal Aviation Authority took eight months to grant Amazon an "experimental airworthiness

Financial Governance
Playing Catch Up

The financial sector has been especially vulnerable to high risk clockspeed. As more banks use technology to conduct shadow banking activities, regulators are forced to play catch-up. Despite their best efforts, regulators are always several steps behind. Regulations to counter financial fragility have been quickly circumvented by bankers before coming into effect, as demonstrated by each iteration of the Basel Capital Accord. Basel I & II were implemented in the 1990s to counter financial fragility, but was quickly undermined by creative bankers. Regulators recently introduced Basel III to force banks to hold more capital, but these have been circumvented before coming into effect. The failure of central bank regulators to keep up with the digitalisation of financial and banking sectors has proved to be costly, contributing to financial crises in the past three decades.[1]

Note

1. Jonathan McMillan, "Banking in the Digital Age: The Failure of Financial Regulation", *The Guardian*, January 20, 2016, accessed October 29, 2017, https://www.theguardian.com/sustainable-business/2015/jan/20/finance-in-digital-age-while-regulation-stuck-in-industrial.

certificate" to test a model of flying drone, by which time the model was obsolete. In other cases, slow regulatory responses towards emerging technology have triggered market-led efforts to fill the void—the European Regulatory Initiative led by blockchain investment platform Neufund was a response to the silence of regulatory authorities towards cryptocurrencies, blockchain technology, and Initial Coin Offerings (ICOs). The Partnership on Artificial Intelligence, which aims to set social and ethical best practices for AI research and applications, is led by industry players like Google, Facebook, Amazon, IBM, and

Microsoft.[6] Policymakers are noticeably absent from the conversation.

When policy clockspeed is out of sync with an accelerating technology clockspeed, we are in a *high risk clockspeed* environment.[7] In such an environment, the ability of decision-makers to process, understand, and react to the changing environment is diminished, because actionable information, expertise, and timely levers are not easily available. These varying clockspeeds create a conundrum for policymakers: How do we regulate or govern technology we do not understand or have sufficient control over? How can the public sector keep pace?[8]

Accelerating Policy Clockspeed: Three Ideas

For Singapore's public sector, managing emergent technology risk has largely involved designing regulatory sandboxes, or adopting a "wait-and-see" position, in order to avoid stifling innovation through premature regulation. The Monetary Authority of Singapore's (MAS) FinTech regulatory sandbox, for example, enables financial institutions and financial technology (Fintech) startups to experiment with new ideas for a limited duration of time, without having to worry about whether their technology meets existing regulatory requirements.[9] More recently, MAS has also adopted a "wait-and-see" approach to regulating cryptocurrency.[10]

> For the government to govern technology effectively, it needs to be *in* the very sandbox it is creating: to become an expert adopter of technology, rather than just an informed regulator.

There is certainly a place for such strategies: they buy time for more relevant information to be incorporated into the policymaking process. However, they do not fundamentally hasten the policy cycle clockspeed. As the gap between technology and policy clockspeeds continues to widen, policymakers and regulators may eventually be forced to tradeoff innovation for risk management.

Policy clockspeed should also be proactively accelerated at the same time, particularly in high risk clockspeed domains. This would involve building and harnessing expertise, learning by doing, and developing the agility to operate at the frontier of emerging technologies. Ultimately, for the government to govern technology effectively, it needs to be *in* the very sandbox it is creating: to become an expert adopter of technology, rather than just an informed regulator waiting on the sidelines.

Three new ideas may help accelerate policy clockspeed:

1 RALLY "POLICY COMMANDOS"

When Singapore's MRT Circle Line was hit by a spate of mysterious disruptions in late 2016, a team of three GovTech data scientists stepped up to support investigations.

Using data from train operator SMRT and the Land Transport Authority (LTA), they pinpointed a rogue train, PV46, as the cause of breakdowns in all but three hours, and, together with the inter-agency investigation team, caught the rogue train by sundown. No machine learning, no AI, no fancy technical methods were involved. In fact, what shone a new light on the mystery was a simple scatterplot (inspired by the Marey Chart). [*For more on this story, see "Data Science in Public Policy—The New Revolution", in ETHOS Issue 17.*]

What made the difference was the applied experience of the data scientists, who had honed their analytical skills and instincts through collaboration with agencies on data science projects across varied policy domains. They knew where to begin their sleuthing, which methods to try, and most importantly, which features to visualise on the scatterplot. Their efforts helped achieve a critical objective (identify the source of the problem), which proved decisive in turning the tide. But it took the entire corps to win through: in this case, DSTA engineers narrowed down the hardware issues with PV46, while transport planners coordinated train schedules, and information officers engaged the public.

Quality decision-making under a fast clockspeed environment requires domain expertise, but also sometimes—as in the case of the rogue train mystery—non-domain expertise, which can help decision-makers think out of the box. A government adept at responding to fast clockspeed risks would develop and retain a core of diverse technical talent, and design institutional structures that allow both domain and non-domain experts ("policy commandos") to work collaboratively on problem solving. These interdisciplinary taskforces would be empowered by senior management, and comprise functional experts (a mix of policy, operations, technology, and communications specialists) across the Public Service.[11]

Design institutional structures that allow both domain and non-domain experts to work collaboratively on problem solving.

2 LEARN BY DOING

Governments around the world—including Singapore—are in the earliest stages of deploying big data, machine learning, and AI to regulate behaviour and enforce laws. These developments will have profound implications for the relationship between private citizens and the state.

However, the governance of AI is unlikely to be straightforward. Developing algorithms in a sandbox environment is different from operational deployment, where more complex policy and

operational issues arise. For example, who bears liability if the AI makes a wrong recommendation? How will an AI recommendation feed into the decision-making process, and when do humans override the algorithm? How important is it to understand why the AI made its recommendation? Who will maintain the algorithm? How much should the public know, and what should we communicate to them about how the algorithm works? How will government manage instances when AI gets things wrong, in order to make good any harm done or trust compromised?

As with all complex issues, the answers to these questions are unlikely to be knowable ex-ante, and the full implications of operational deployment will only emerge after the algorithm is integrated into actual decision-making processes, with real users. The more we experiment, the more real-world feedback there will be to learn from, and the more responsive our policy responses can be. We must learn by doing.

3 THINK AGILE

The "waterfall" approach to policymaking is familiar to policymakers: studies are commissioned by committees, their findings deliberated, then stakeholders are consulted, before the policy is finalised and implemented. In an "agile" approach, the policymaker seeks to get a first-cut approximately right, and to iterate with users and stakeholders based on real-world testing and dynamic feedback (see Figure 1).

In an "agile" approach, the policymaker seeks to get a first-cut approximately right, and to iterate with users and stakeholders based on real-world testing and dynamic feedback.

Being agile is not a formulaic process, but a mindset that rests on several principles:

i. **Policies are in *permanent beta*.** Policies are not thought of as tending towards any stable equilibrium, but are tweaked according to real-world feedback. Policymakers acknowledge that they do not have all the answers, but are willing to make decisions based on the best available information, and prepared to adjust along the way.

ii. **Iterate based on *timely data*.** Timely information is needed to evaluate impact and inform the next policy iteration. Administrative data should therefore be shared seamlessly and securely—in days, rather than months. Organisational structures should facilitate timely feedback loops so that policy ideas can be continuously tested and evolved based on the evidence.

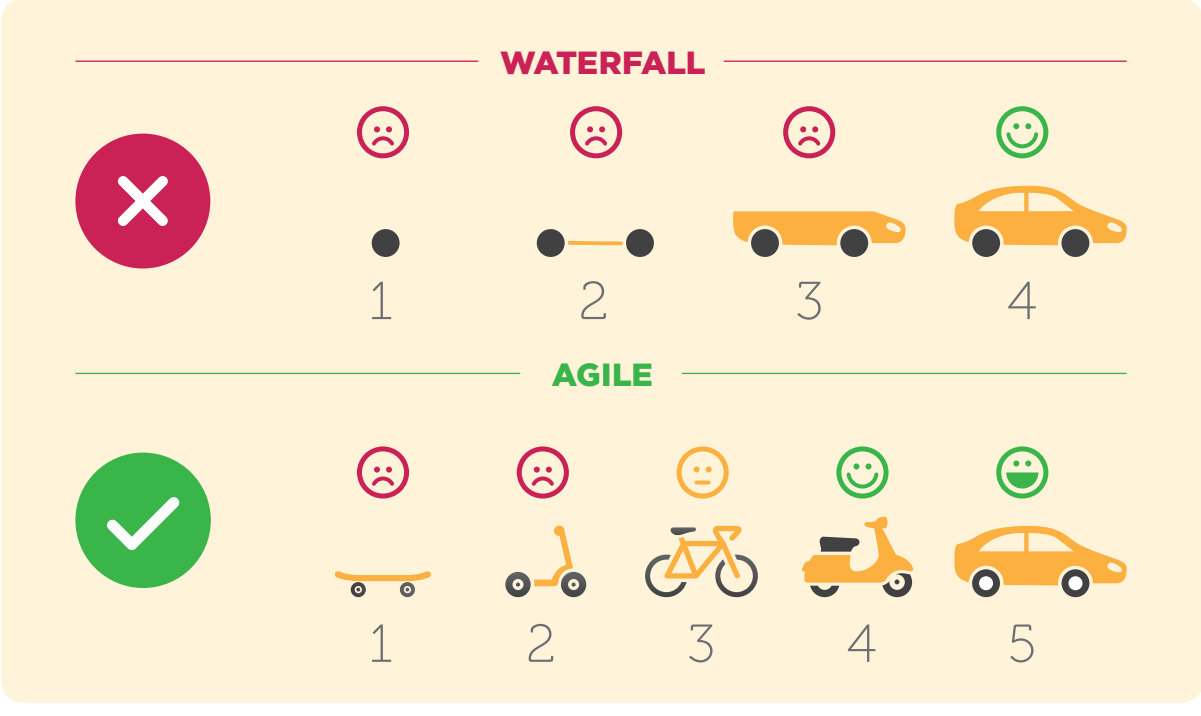


Figure 1. "Waterfall" versus "Agile" Approach to Product Development[12]

iii. **Proactively *communicate*.** Transparency is necessary for public accountability, but also for public buy-in to a culture of policy "beta-testing". For example, if government were to deploy an AI algorithm to enhance delivery of public services, it should state the model and relevant parameters used, the governance framework, and how the algorithm's performance will be assessed. Communications should also be more tightly integrated into the policy process, to support the evolving policy.

These agile principles represent significant mindset shifts for the public sector, because they mean publicly acknowledging that government does not have all the answers, and accepting a higher level of transparency and public scrutiny. Yet, increasingly, these will become tradeoffs that government has to make in order to remain relevant in a high-risk clockspeed world.[13]

Case Study

How Parking.SG Evolved from an Idea to National Product in Eight Months

A small inter-agency, multi-disciplinary team can iterate and deliver on an impactful solution in months, rather than years, by adopting an agile approach. Case in point: the Parking.SG mobile app, which grew from idea to national product in just eight months.

PERMANENT BETA

Parking.SG is more than just an app with a well-designed user-interface. Making the concept work involved many interlinked issues, including product engineering, payment infrastructure and enforcement. The team chose not to worry about having the 'perfect' app: instead, they had a rough idea for its initial design and architecture, and focused on getting a minimal viable product out to market every four to six weeks. The first prototype app was 'broken' in many ways, but worked well enough to validate core concepts for the next iteration. Such agility was only possible because the team had the technical expertise to develop the app in-house, and therefore had full control over product development. This meant the team could actively push back on feature requests from even senior management, if they thought the suggestions bad for the product.

ITERATE BASED ON TIMELY DATA

With each working prototype, the team walked with parking enforcement officers on the ground to observe how they carried out enforcement checks and verified the validity of parking coupons. They also interviewed Urban Redevelopment Authority (URA) and Housing & Development Board (HDB) operations officers and motorists to understand their needs. These insights and data points were incorporated into the next app version, in a continuous cycle of experimentation, feedback, and rapid iteration. Once the basics were firmly established, the team launched a trial with a small group of public officers within four months to gather real-world feedback. Within eight months, the app was deployed nationwide.[1]

PROACTIVELY COMMUNICATE

At every stage of development, the team was proactively in touch with stakeholders. The message from the outset was this: the team had released a working app, users can expect bugs and should actively provide feedback for improving subsequent app releases. This helped manage the public's expectations: ensuring that citizens did not expect the app to be perfect, but instead appreciated the effort to get a useful product quickly to market.

Note

1. A team of three GovTech specialists (a product manager, a software engineer, and a UX designer) worked closely with a small team of policy officers and ground enforcement officers from the Ministry of National Development, URA and HDB. The team deployed a minimal viable product for beta testing among public sector users in just four months—the typical time it takes to call for a government tender.

PUBLIC SERVICE 2021

A Vision

The year is 2021. The global economy shows signs of slowing, while countries that have harnessed technologies in the Fourth Industrial Revolution are powering ahead. Google has completed its Project Baseline and identified the genomic sequences that increase risk of diabetes. Deep learning algorithms have advanced and are now explainable; San Francisco announces its first AI-enabled hospital.

In response to these trends and events, the Public Service has gone digital to the core and embraced new ways of working across government. Policy by inter-agency, action-oriented red-teams has become the norm. Red-teams are scheme- and paygrade-agnostic, and team composition is drawn from across government and determined by functional expertise.

The project team lead for one of the red-teams is a "generalist" who started out as a data scientist at GovTech for three years, before taking on policy and operational roles at the Ministry of Health (MOH) and Workforce Singapore (WSG). Team members include AI specialists from GovTech who began their careers at Silicon Valley start-ups, a behavioural scientist from the Ministry of Home Affairs (MHA) with design thinking experience, policy officers from the Ministry of Education (MOE) and Ministry of Manpower (MOM), an information officer from the Ministry of Communications and Information (MCI), and a legal officer from the Attorney-General's Chambers (AGC) with experience working on AI and data privacy issues. They are advised by a Taskforce that includes representatives from labour unions, technology companies, and institutes of higher learning. The team has been tasked to deliver actual solutions that can be operationalised, not a slide deck or white paper.

The team is a diverse lot, but they will be working together over the next three to five years to deliver on several pilot projects, some of which will be scaled up through policy interventions. Government is actively encouraging public officers to devote lengthier stints to each posting, and to strongly consider hands-on, technical roles. The distinction between "policy" and "operational" roles has all but disappeared. It is clear that policymaking is not just about analysis, but about making things happen.

Not all problems in the public sector are solved through policymaking. Accelerating technological clockspeed creates time pressure but also opportunities to solve problems through new means.

How can we achieve the vision of an agile Public Service adept at operating under accelerating clockspeeds?

The traditional approach to policymaking—of planners systematically and meticulously thinking through and designing "masterplans" to address challenges of the day, and leaving it to the operational agencies to implement their plans—has generally served Singapore well. There is still a place for such an approach, as citizens will expect rigour, stability, and certainty in some policy domains, such as school placement or housing. However, masterplanning will become increasingly difficult in a rapidly evolving operational environment.

There is room for rethinking how we conceive of "policymaking", of "policymakers", and how we build and leverage on expertise across the service. Not all problems in the public sector are solved through policymaking—a parking app, for example, is not a policy per se, but an innovation in service delivery. Accelerating technological clockspeed creates time pressure for policymakers and regulators, but also opportunities to solve problems through new means—to not just regulate, but also innovate; not just create a sandbox, but be in the sandbox. The latter demands a rethink of how we embed functionally diverse roles and expertise within the same team (e.g., policy and operations officers, data scientists, communication specialists working in an integrated policy team) to deliver actual policy solutions that can be rapidly operationalised.

In an age of accelerating technology clockspeeds, effective problem solving cannot be achieved primarily through planning and debate. Problem solving will have to be a process of learning-by-doing, building and leveraging expertise, and delivering through red-teams across agencies, rather than waterfall planning within the silos of agencies. Solutions will be found not in "policy", "operational", or "engineering" worlds, but in bringing these together and taking collective ownership over successes and failures. Public officers will be "makers"—creative, innovative, and entrepreneurial—in the truest and most fundamental sense of the word.

Will this new mode of government succeed in navigating Singapore through the Fourth Industrial Revolution? We think building a truly agile Public Service would give us a better chance. Let's think big, start small, and act fast. ■

The views expressed in this article are the contributors' own and do not reflect the position of the Government of Singapore.

Notes

1. The authors would like to thank the following individuals for reading earlier drafts and providing valuable feedback: Aaron Maniam, Jason Bay, Beh Kian Teik, Hannah Chia, Joanne Chiew, Chng Kaifong, Dong Yangzi, Gaurav Keerthi, Melissa Khoo, Jasmine Koh, Kwok Jia Chuan, Peter Ho, Li Hongyi, Gabriel Lim, Mark Lim, Liu Feng-Yuan, Robert Morris, Ng Chee Khern, Vernie Oliveiro, Jacqueline Poh, Jeffrey Siow, Tan Gee Keow, Tan Kok Yam, Tan Li San, Wu Wei Neng, Karen Tay, and Leo Yip.

2. Charles Fine, *Clockspeed: Winning Industry Control in the Age of Temporary Advantage* (Reading, MA: Perseus Books, 1998).

3. The definition of technology clockspeed will depend on whether our aim is policy response or policy innovation. In domains where we seek policy innovation, then the relevant milestone would be when technology reaches early adoption.

4. Alison Berman and Jason Dorrier, "Technology Feels Like It's Accelerating—Because It Actually Is", *Singularity Hub*, March 22, 2016, accessed October 19, 2017, https://singularityhub.com/2016/03/22/technology-feels-like-itsaccelerating-because-it-actually-is/#sm.00015yhzqj4ze3a10e51ekeumwuld.

5. Policy clockspeed varies across domains, depending on the nature of the policy issue, issue salience, availability of data to evaluate policy effectiveness, and time lag for the policy's impact to be felt. For example, the Inland Revenue Authority of Singapore (IRAS) amends the income tax structure every five to 10 years; the Ministry of Manpower (MOM) reviews the Workfare Income Supplement criteria every three years; the Ministry of Social and Family Development (MSF) reviews the composition of the ComCare basket annually; MAS reviews monetary policy every six months.

6. The "Partnership on AI" was formed by Google, Facebook, Amazon, IBM and Microsoft to set societal and ethical best practice for artificial intelligence research. See Partnership on AI (website), accessed October 29, 2017, https://www.partnershiponai.org/.

7. Technology, policy, and risk clockspeeds are highly context-specific. Policymakers should evaluate whether there are high-risk clockspeed domain areas *in their own specific contexts*, for which policymaking and regulation should be rethought.

8. Our article focuses on the public sector and how it can transform itself to be more adept at operating in a high risk clockspeed environment. However, for Singapore as a country to move ahead, society-at-large also needs to adapt. There will be those who fall behind, and government will need to address the issue of technology adoption, inclusion, and the attendant inequalities that might arise. The e-payments space is one example—the technology is available, but not all segments of society are prepared to adopt it; getting them on board requires active change management and applying a citizen-centred lens to the issue.

9. Monetary Authority of Singapore, "FinTech Regulatory Sandbox", accessed October 29, 2017, http://www.mas.gov.sg/Singapore-Financial-Centre/Smart-Financial-Centre/FinTech-Regulatory-Sandbox.aspx.

10. Jacquelyn Cheok, "Singapore Not Rushing to Regulate Cryptocurrencies: MAS", *The Business Times*, October 26, 2017, accessed October 29, 2017, http://www.businesstimes.com.sg/technology/singapore-not-rushing-to-regulate-cryptocurrencies-mas.

11. SMRT and LTA tapped on data scientists from GovTech and engineers from DSTA to help solve the Circle Line mystery—demonstrating that current decision-making processes were effective. To accelerate policy clockspeed, what worked well should be institutionalised and scaled across all of government, to minimise the role of luck or having the right mix of aptitudes involved.

12. Adapted from Henrik Kniberg, "Making Sense of MVP (Minimum Viable Product)—and Why I Prefer Earliest Testable/Usable/Lovable, January 25, 2016, accessed November 25, 2017, http://blog.crisp.se/2016/01/25/henrikkniberg/making-sense-of-mvp.

13. The agile approach must be applied in tandem with human-centric design, with an empathetic eye on the citizens' experience.

The **Digital Social Contract** and **e-Legitimacy**

by **Max Everest-Phillips**

New institutions are needed to manage both the potential and risks of digital technologies that will reshape our societies and how they are governed.

Max Everest-Phillips is Director of the United Nations Development Programme's (UNDP) Global Centre for Public Service Excellence (GCPSE) in Singapore.

The technologies underlying the so-called "Fourth Industrial Revolution" are altering the relations between states and their populations, as well as the role of the civil service in mediating change.

Better policy requires improved evidence: machine-based learning and analysis[1] will offer deep unprecedented insights into both collective and individual human behaviour, supplanting humans—who suffer from bounded rationality and cognitive biases—as the primary means of collecting, processing, and interpreting information. Digital public empowerment, big data and artificial intelligence (AI) will challenge every government with an unprecedented degree of cognitive dissonance. This will reshape how political, social and economic incentives, interests and ideas are understood, negotiated, and contested.

Digital public empowerment, big data and artificial intelligence (AI) will challenge every government with an unprecedented degree of cognitive dissonance.

Profound new opportunities for governments to engage more effectively with citizens are emerging. At the same time, anxieties arising from this impending change are on a scale that is hard to forecast, as is the likely impact on deeply cherished social values.

The Effective e-State

For countries to thrive in the future, adopting new technology is not enough; institutional underpinning will remain critical. All states gather data on their citizens, but how this data is used will depend on the quality of governance. Public organisations will need to manage how the collection, analysis, and use of big data creates

Pressures on privacy in the era of digital governance:

- new technologies, including big data and AI
- Whole-of-Government data sharing
- social media: a spurious sense of intimacy and the risk of bias, misinformation and fake news
- the digital economy
- hacking, leaks and fraud, facilitated by inter-connectivity and inter-operability

heightened risks over the privacy and security of citizen data.

States are struggling to respond. The methods of controlling national territory cannot police a non-physical space like the Internet. Its governing body, the Internet Corporation for Assigned Names and Numbers (ICANN), seeks to preserve its "operational stability, reliability, security and global interoperability" in the face of threats to the 'world-wide' ideal from government censorship.[2] Unauthorised access to digital systems, from data manipulation, forgery or theft, can originate anywhere around the globe. In response, effective democratic states are evolving a digital, non-territorial fourth dimension.

The political imperative of privacy will increasingly place public administration in a contradictory tension between joined-up knowledge and confidentiality. Government agencies have devoted much attention to overcoming silos and creating whole-of-government approaches. For such collaboration to work, participating agencies must share sufficient access to each other's data. At the same time, the state is trying to enforce personal privacy protection by restricting access in compliance with current fragmented mandates. Privacy, Big Data and AI lie at the shifting and contested intersection of commercial profit, public policy, and cultural attitudes.

The Privacy Paradox

AI makes it easier than ever before to learn more about individuals. Recent research suggests that AI can already guess sexual orientation based on photographs of faces more accurately than humans are able to do. AI could therefore be used to classify people without their consent, and perhaps to identify other possible links between publicly disclosed information and phenomena such as political views, psychological conditions or personality traits.

Privacy, Big Data and AI lie at the shifting and contested intersection of commercial profit, public policy, and cultural attitudes.

New technologies highlight that cultural attitudes to privacy vary and can often be contradictory. Privacy, as the protection of personally-identifiable data according to fair, moral, legal, and ethical standards, is a social construct.

Governments are being exhorted to deliver better targeted services to citizens. But this use of big data arouses concerns about privacy and ethics. For instance, the use of AI in police profiling to predict people's behaviour risks may reinforce stereotypes and social exclusion, subverting individual choice and equal opportunities.

People can be cautious about their personal information being collected and stored by government agencies or by corporations. Yet on the other hand, they may readily reveal the same intimate details of their lives on social media posts, blogs, and profiles.

In this, the individual exercises personal choice. However, people are increasingly disclosing, and are required to disclose, personal information over the Internet in order to participate in the modern digital society and economy. Privacy is becoming more complex, negotiated and contested, and is already losing out to technologies that make life easier: mobile smartphones that record our every move, search engines that note our every interest. Citizens collude with this algorithmically driven trend, wanting better customer satisfaction and user experience. Fluid identities in an era of constant technological change have rendered the traditional "right to privacy" an anachronism.

Digital ID systems: attitudes vary

Privacy worries over national ID systems highlight another stark cultural divide. While countries like Australia and Ireland seem troubled by "Big Brother" connotations of ID cards that can act as unique identifiers on-line, other democratic societies, like Finland and Sweden, issue them without political demure. Such systems can transform government capability.

Perhaps the most striking example is Aadhaar, India's biometric digital identity scheme.[1] It has enrolled 1.16 billion people between 2010 and August 2017. The Indian government considers Aadhaar a "strategic policy tool for social and financial inclusion, public sector delivery reforms, managing fiscal budgets, increasing convenience and promoting hassle-free people-centric governance."[2] Aadhaar authentication is widely used by the private sector, banks and telecommunications companies, and by the National Payment Corporation of India.

Yet the Supreme Court of India observed in August 2017 that the privacy and data management implications of AI, storing ever more personal information, are immense. It unanimously ruled that privacy is a fundamental right, curtailing the government's effort to ensure complete enrolment by restricting access to essential public services for anyone not in the system.

Notes

1. Aadhaar is a 12-digit number issued by the Unique Identification Authority of India.

2. Digital India, accessed October 7, 2017, http://digitalindia.gov.in/di-initiatives.

Citizen trust is frequently tied to the issue of privacy. Regulators are urged to implement stringent data protection to ensure that data is only used for the purpose for which it is collected (the "purpose limitation" principle of contemporary data protection rules). Yet the traditional concept of privacy is increasingly outdated. The rights-based approach to the protection of privacy and personal data assumes that the state, through control over its territories, is able to fulfil its role as duty-bearer. The digital world is proving more difficult to fully police. Data can be easily moved across borders, stolen, or recorded without consent. The "Dark Web" is awash with criminal activity, including the sale of stolen personal data.

Tech solutions to privacy concerns

It is, of course, possible to improve privacy requirements by masking or anonymising the data collected so as not to gather specific information about an individual. Privacy engineering principles such as "privacy by default" and "privacy by design" algorithms can conceal identities and aggregate data in order to protect the individual while harnessing its predictive power. Apple's iOS 10 offered "differential privacy", which recognises app and data usage patterns among groups of users while obscuring the identities of specific individuals.

New technologies like Distributed Ledger Technology (DLT) may promise enhanced privacy. Blockchain is a type of DLT. First conceived for the creation of cryptocurrencies (such as Bitcoin), it has other possible applications, including identity verification, which may give individuals greater control over who has their personal information and how they access it. To protect personal data online and in mobile environments, enhanced authentication features such as electronic trust services—which include e-signatures, e-seals, and time stamps—can help to build confidence in electronic transactions.

Technology can be designed to support societal values and respect fundamental rights of the individual.

Such examples show how technology can be designed to support societal values and respect fundamental rights of the individual. Nevertheless, other threats—such as identity theft, cyberattacks, or unauthorised access and sharing of data—remain.

Towards a Digital Social Contract

Sir Tim Berners-Lee, inventor of the World Wide Web, has called for a digital Magna Carta, and in the US, similar suggestions have been put forward for a digital Bill of Rights. This would constitute a social contract and basis of consent on which a state can build its e-legitimacy.[3] Such digital constitutions would set out the fundamental principles governing the Internet, the powers of governments to control it and tax e-commerce, and the rights of e-citizens to communicate freely. In the face of cyberattacks, for instance, having citizens' prior consent to digital defences, which may involve curtailing or suspending e-rights such as digital privacy, becomes exponentially important.

Research suggests that trust in government and state legitimacy are not principally created by democracy, the rule of law, or the efficiency and effectiveness of government. Instead, trust and legitimacy are the outcomes of "the impartiality of institutions that exercise government authority."[4] If impartial—not just effective—public administration builds trust between the state and citizenry, and stimulates markets, the implication is a digital social contract that should be articulated. It will be based on the negotiation over shared e-democratic principles such as sustainability, accountability, openness, with citizens in active partnership. Leaders will need to articulate and defend the values of digital society which are currently poorly formulated by the state. Some countries have made headway: Singapore's "Smart Nation" approach articulates a vision of people "empowered by technology to lead meaningful and fulfilled lives",[5] while e-Estonia promotes a global vision for digital identities that complement the analogue nation.

Should there be a digital social contract?

In the 1950s, following US President Eisenhower's "Atoms for Peace" address[1] to the General Assembly of the United Nations, the International Atomic Energy Agency was set up to allay fears while harnessing the huge potential generated by civilian nuclear technology. In a similar vein, perhaps the UN should be asked to lead in setting international rules to govern disruptive digital technologies. "Big Data for Peace" will require effective and trusted e-institutions.

Note

1. International Atomic Energy Agency, "Atoms for Peace Speech", accessed October 7, 2017, https://www.iaea.org/about/history/atoms-for-peace-speech.

Government and state legitimacy are not principally created by democracy, the rule of law, or the efficiency and effectiveness of government. Instead, trust and legitimacy are the outcomes of "the impartiality of institutions that exercise government authority".

A different view of privacy:
Social Obligation

Whereas most countries enforce strict privacy over tax returns, Norway, Sweden and Finland take an opposite approach: "Publish what you pay".[1] The tax authorities of these three Nordic countries maintain the National Population Registers and disclose a summary of the income (after deductions), net worth, and the total amount of taxes paid of every taxpayer online.

This information is not entirely public. Access is open to citizens who log in to government websites but usage is recorded: people whose data is reviewed have access to the list of their fellow citizens who have inspected returns. Such two-way transparency is designed explicitly to build the legitimacy of the state, improve tax compliance and create a culture of tolerance and fairness. This is an important corrective. Although the right to privacy receives considerable attention, the complementary "duties to the community"[2] also enshrined in international law is often overlooked.

Notes

1. An international movement to establish transparency and effective use of private sector payments to governments for the right to extract non-renewable resources.
2. United Nations, *United Nations Universal Declaration of Human Rights 1948*, 1948, Article 29, 8, accessed October 7, 2017, http://www.jus.uio.no/lm/en/pdf/un.universal.declaration.of.human.rights.1948.portrait.letter.pdf.

Conclusion

An increased focus on privacy and tools to prevent the misuse of machine learning as it advances and proliferates will prove futile. Laws and technological protection of privacy will not stop the steady further erosion of privacy. Instead of anxiety, citizens should recognise the inevitable and embrace it. Putting complete faith in convoluted but fallible legislation and regulation of the digital "no man's land" seems unwise. Governments and citizens need to proceed by ensuring that the post-privacy e-state is a tolerant place,

buttressed by effective institutions that build citizens' trust.

The effective use of new technology ultimately depends on effective citizens, officials and entrepreneurs. To avoid the exaggerated expectations and excessive disillusionment over disruptive technology, techno-literacy will prove a key skill for the citizen, politician and official alike. The ultimate purpose of technology is not to build smart cities or smart nations, but to foster smart people—an educated citizenry that cherishes a flourishing society and vibrant economy driven by such attributes as creativity, inclusion, gender equity, humility, intellectual curiosity—and empathy for all intelligent life forms, human or robotic. ■

The ultimate purpose of technology is not to build smart cities or smart nations, but to foster smart people.

This paper is based on personal reflections from the Disruptive Technologies and Public Service Conference that GCPSE organised in September 2017, and benefited from comments provided by Peter Lovelock, Jane Thomason, Graham Teskey, and Anneke Schmider. The views expressed here are the author's own and do not necessarily represent the views of UNDP.

Notes

1. William D. Eggers, David Schatsky and Peter Viechnicki, "How Artificial Intelligence Could Transform Government", *Deloitte Insights*, April 26, 2017, accessed October 7, 2017, https://dupress.deloitte.com/dup-us-en/focus/cognitive-technologies/artificial-intelligence-government-summary.html.
2. ICANN, "Security and Stability", accessed October 7, 2017, https://www.icann.org/resources/pages/security-stability-2013-06-14-en.
3. Estonia has already created e-residency. The e-resident's smart card allows non-Estonians access to government services such as company formation, banking, payment processing, and taxation. It is aimed at attracting the digitally-independent.
4. Bo Rothstein and Jan Teorell, "What Is Quality of Government? A Theory of Impartial Government Institutions", *Governance* 21, no. 2 (April 2008): 165–190.
5. Smart Nation Singapore, "Smart Nation", accessed October 7, 2017, https://www.smartnation.sg.

The Digital Work Economy and Our Human Future

by **Gary A. Bolles**

Leading tech strategist Gary Bolles offers a balanced perspective on the impact of technology on jobs, institutions, learning and human development.

Gary A. Bolles writes and speaks around the world on the transition to a digital work economy, focusing on strategies that can help individuals, organisations, communities, and countries. He is the Chair for the Future of Work for Singularity University, co-founder of eParachute.com, and partner in Charrette LLC, a boutique strategy consulting firm based in San Francisco.

1

How should we be thinking about the future of work?

The single most important insight about the future of work is that it has nothing to do with the future. We are already deep into the transition to what I call the *digital work economy*. Trying to guess what the world of 2050 will look like isn't an especially useful activity today, because all the challenges and opportunities of a world of work transformed by automation and globalisation are already here.

Of course we all would love to see the future, so we can make the most appropriate decisions, and try to avoid bad things happening. As Singularity University co-founder Ray Kurzweil has often said, technology has always been a double-edged sword: beginning with fire, which warmed us, but also burned our houses. Some of us want to foresee the results of technology's impact on the world of work because of concerns that robots and software have the potential to perform virtually any task, thereby making human work obsolete.

But I call that "hi-tech dancing in the end zone": Silicon Valley sees its technologies as being so unrelentingly successful at automating human tasks, that all technologists can see is an overwhelmingly automated future.

That's simply a collective failure of imagination. We would all have had the same misconception if we'd gone back 150 years, to the start of the industrial revolution, and tried to envision jobs for 3 billion people. It's entirely possible that this time will be different—we're talking

about software and robots, after all, not mills and looms—but even the most far-seeing forecasters can't know the actual future impact on human work.

That's because automation doesn't replace jobs: it performs tasks. It's a human's decision if a job goes away.

Work is actually three very simple components. We're paid to work because we solve problems. How do we solve problems? We perform tasks. How do we perform tasks? We use our skills. So, humans use their skills to perform tasks so we can solve problems. Bundle up all of the problems that each of us solves in our work, and that's a job.

Automation doesn't replace jobs: it performs tasks. It's a human's decision if a job goes away.

Along comes a robot, or a piece of software. That technology rarely performs all of the tasks of any worker's job. But because software and robots perform a human's former tasks, a worker's job is inevitably changed by the introduction of technology. It's a human's decision as to how that worker's tasks are reorganised, and whether or not a job goes away.

Rapid-growth companies often have a commitment to maintaining existing workers, because they need all the people they can get. But slower-growth companies have a tendency to use robots and software to replace human work—and lay off workers who are no longer needed. Leaders need to invest in programmes and technologies to help workers disrupted by automation.

Automation almost always represents new opportunity. There are very few buggy whip manufacturers any more, but there are a lot of car mechanics. We have to ask: What new work is created because of automation? How easy is it for existing workers to learn to perform that new work? Where is that new work, geographically? Does that new work pay as much as the old work? And does the overall pool of work—all the compensated work that humans can do—continue to grow? Or does it start to shrink, as technologists look for more and more tasks that can be automated?

The main reason that so much entrepreneurial energy is applied to automating human tasks is that the venture-backed model of start-ups inevitably looks for existing markets to disrupt. In developed economies, human labour is an expensive cost centre, so it's easiest to find a set of tasks that can be replaced by automation.

We need to think differently. If we take the same amount of energy and capital that's currently focused on disrupting human labour, and instead focus it on upskilling and enhancing human capabilities, we'll create far more work opportunity than we'd ever imagined.

Along the way, we'll also need to become more flexible in our thinking about *where* work is performed. By training managers to coordinate remote workers, we can ensure the ongoing viability of our rural areas, letting talented workers stay where they have the greatest quality of life.

2 What can we do to mitigate the challenges and make the most of opportunities in the digital work economy?

There are many useful strategies for individuals, organisations, communities, and countries. I'm helping to guide an initiative to aggregate all of those strategies, by collaborating with organisations around the world. But here are some of the strategies we know are critical.

For communities and countries, policymakers need to understand that traditional institutions, such as work, education, and healthcare, are designed for a world that has already changed dramatically. We need to think about meaningful and reliable paid work instead of jobs, lifelong learning instead of traditional education, and healthcare tied to the individual rather than the organisation.

Policymakers can also work with industries to increase the signals they send to the work market, so workers have a greater certainty that there will be near-term work available for them. Singapore has done this by encouraging a range of industries to collate their projections for future worker needs. Education providers can then take this information and create what Udacity.com calls nano-degrees—focused learning opportunities for specific job opportunities.

Policy stakeholders can also encourage hirers to "soften the walls" of their organisations. By providing economic incentives to increase programmes like mentorships and internships, making internal training programmes available to independent workers, and hiring workers in rural areas, policymakers can dramatically accelerate the process of making work and training more broadly available.

3 In what ways can public policy facilitate a more flexible, adaptive, learning workforce?

Any strategy for large-scale workforce flexibility has to start with the individual. Each person has a unique set of skills and experiences. Each individual needs to learn how to continually do a "self-inventory" to know what makes them unique. They also need the tools to envision the kind of work they'd like to do in the future, and have support in either finding or creating that kind of work.

Structurally, we need to move away from the idea of a "job" to what I call "unbundled work". As the definition of a career is shifting from lifelong work

in a single field, to an individual's entire relationship with the world of work throughout their lives, workers will need to pursue what I call "a portfolio of work": a range of projects and work roles at any point in their work lives. The traditional one person-one job role will never go away, but there will be fewer people working in those roles, and more who will be working independently in a variety of activities at any one time. Yet governments will need to help smooth the ups and downs of that kind of model, and help workers when their income inevitably dips.

We need to empower individuals with the tools to drive their own direction in life.

This "unbundling" also means that we need to completely rethink traditional retirement. Since we're moving towards a model of lifelong learning and lifelong working, we also need a model of lifelong leisure. We need to be as intentional about planning for leisure as we do for work and learning. We need to intentionally plan time for family, hobbies, and fun—or else work will fill every waking hour, with all of the physical and psychological challenges that come with it. We need "alternating rhythms" in our lives, doing a range of different activities on a regular basis, to keep ourselves stimulated, engaged, and healthy. The industrial-era model only allowed us to enjoy leisure at an advanced age, but so long as governments continue to encourage saving for our later years, we can ensure that workers can enjoy extended leisure at various points throughout their lives.

If we're going to make an actual commitment to lifelong learning, we have to completely rethink our schools. Most public and private education is built on an industrial-era model of mass production, segmenting students by age without regard to learning style or innate skills, and using mechanisms like testing to ensure students move forward as an age cohort. But given the rapid pace and spread of change, we have to prepare our youth to be adaptive and agile learners—and we can't do that with learning factories. We need to provide much more flexible learning environments throughout our lives, and help people to pro-actively design their own learning goals, and have access to a range of learning situations.

When it comes to college-age learners, we need to move away from the degree model, which simply reinforces a production-era mentality, and instead move towards a functional skills model that supports more discrete chunks

of learning, and provides certification mechanisms that look more like learning badges than degrees.

For disadvantaged populations of any kind, the single most important thing we can do is to sponsor "agency". We need to empower individuals with the tools to drive their own direction in life, and provide them access to the learning resources they need to ensure they're prepared for their next work transition. And we need to support a variety of ways for workers of all kinds to band together for their mutual benefit, supporting mechanisms like guilds to ensure that groups can collectively support each other.

The real deliverable is to upgrade our organisations, our learning institutions, and our governments to be perpetual adaptation machines.

4 What should we keep most in mind when thinking about how to address the future of work?

We need to stop thinking that there is some ideal answer about where the world of work is going, and to instead realise that the single most critical thing we can do today is to design for adaptability. I can say with absolute certainty that the world of work in 20 years will be dramatically different than we envision today. So the real deliverable is to upgrade our organisations, our learning institutions, and our governments to be perpetual adaptation machines.

We must also mobilise civil society to commit to the never-ending need for human work. For example, we need to rethink the very nature of business. If the only stakeholder that matters is an organisation's shareholders, then the tyranny of quarterly financial reporting inevitably means that we will do away with costly human labour wherever possible. Instead, we need to expand the organisation's list of stakeholders to include workers, customers, partners, communities, the planet—and, yes, shareholders—so that organisational leaders will make decisions to benefit humans and their work.

We place financial value on the things we value, as people. As the world of work continues to dramatically change before our eyes, we need to commit to one fundamental concept: no human left behind. Only then can every individual thrive in the transition to a digital work economy.

Supporting Job Growth and Worker Prosperity in a New Era of Automation

by **Eoin Daly and Richard Dobbs**

With the advent of advanced automation, governments have a critical role to play in responding to workforce transitions.

Eoin Daly is a senior partner in McKinsey & Company's Kuala Lumpur office and Managing Partner for the firm's Public and Social Sector practice in Asia.

Richard Dobbs is a senior partner in McKinsey's London office and Director for the McKinsey Centre for Government.

Automation has been a fixture in organisations for as long as most of us can remember. Companies have used it not just to optimise labour costs, but also to boost the speed at which new products and processes can be developed and launched, as well as to reduce errors and reap other performance benefits. Governments have an interest in encouraging automation adoption, since it will help boost the productivity of national economies and raise growth.

Governments will need more (not less) data-driven feedback as they determine how to set smart policies, make investments, and provide services relevant to those working in the "new normal".

These benefits are being overshadowed today by near-term advances in automation technologies—including artificial intelligence, machine learning, and robotics—which now raise new concerns about the future of work. Will there be enough work to ensure full employment, and if so, what will those jobs look like? Which occupations will thrive, and which will wither? How will training programmes and wages need to change as machines perform many of the tasks humans do now?

Ongoing research from the McKinsey Global Institute (MGI) is attempting to address some of these questions, offering an empirical perspective on the complicated public debate. Some of our key findings[1] to date include the following:

- More than one-third of activities could be automated for about 60% of occupations. That means people will increasingly need to work with machines across sectors.
- As many as 375 million workers globally (14% of the global workforce) will likely need to transition to new occupational categories and learn new skills, in the event of rapid automation adoption. If their transition to new jobs is slow, unemployment could rise and dampen wage growth.
- Technology adoption can and often does cause significant short-term labour displacement. But history shows that, in the longer run, it creates new jobs and unleashes demand for existing ones—more than offsetting the number of jobs it destroys even as it raises labour productivity.

Governments have a critical role to play in ensuring that labour markets and economies thrive in the wake of advanced automation. They will likely need more (not less) data-driven feedback as they determine how to set smart policies, make investments, and provide services relevant to those working in the "new normal". Ensuring

that their policies maintain robust demand growth to support job growth is an essential prerequisite; history shows that economies that are not expanding do not create jobs.

Beyond that, government leaders will need to focus on several imperatives:

Modernise education systems. MGI's analysis of the capabilities most in demand in this era of advanced automation points to the need for not just technical skills but also teamwork, creativity, high levels of communication, and a range of social and emotional skills. However, educational models worldwide have not fundamentally changed since schools were primarily geared towards ushering students into the industrial era rather than the knowledge economy. Governments and educators need to update the methods by which they develop human capital. They could encourage, identify, and co-finance innovative pilot programmes that address known skills gaps among workers, post-secondary students, and youth, and then scale the ones that work. Apprenticeship programmes in countries such as Germany, Korea, and Switzerland have shown to be powerful for imparting both "hard" and "soft" skills and have particularly benefited youth newly entering the workforce. Policymakers and business leaders working with education providers could improve science, technology, engineering, and math (STEM) skills through school systems, and put a new emphasis on creativity as well as critical and systems thinking.

Expand support for workers in transition. Over the past few decades, investments and policies supporting the workforce have eroded; public spending on training has fallen in most countries. But effective retraining will be critical for mid-career workers who will need to transition to new occupations and different types of work alongside machines. Flexibility and adaptability will be the new workforce mantras. Governments will need to refocus

The capabilities most in demand in this era of advanced automation are not just technical skills but also teamwork, creativity, high levels of communication, and social and emotional skills.

their labour agencies on supporting re-employment and the acquisition of new skills rather than monitoring unemployment benefits or controlling for fraud. Workers will need to take an active role in their own retraining—but labour agencies can help to provide the necessary tools, programmes, and guidance. And it will be incumbent on governments to introduce policies and practices that can help reduce the barriers to worker mobility—for instance, availability of affordable housing and access to quality education.

> **Effective retraining will be critical for mid-career workers who will need to transition to different types of work alongside machines—flexibility and adaptability will be the new workforce mantras.**

Assess how labour markets are functioning. In this age of advanced automation, it is important to assess whether it can be assumed that everyone who works can support a decent standard of living. Having a healthy consumer class is essential for both economic growth and social stability. Some countries already have established income-supplementation programmes, such as the earned income tax credit in the United States, or the Workfare Income Supplement scheme in Singapore.

Use real-time data. As they monitor how labour markets are functioning, governments will need access to lots of economic data. They should seek to supplement static national economic data with real-time data on the adoption of automation technologies, job openings, skills in demand, and how individuals are coping with job transitions. Government statistics agencies could collaborate with job boards, social media sites such as LinkedIn, and private companies to create a more detailed picture of jobs, skills, wages, and individual mobility and career moves.

Incubate new technologies. Governments can support the development and deployment of advanced automation and other emerging technologies by investing in basic and applied research, and by supporting the build out of digital infrastructure. There are a number of next-generation start-ups establishing themselves in vibrant cities such as Amsterdam, Barcelona, and Dublin. TechLondon, the city of London's online platform for connecting and supporting entrepreneurs, boasts more than 70 business incubators and accelerators. Other governments similarly have an opportunity to provide the incentives, access to capital, and

digital infrastructure that will attract the next Alibaba, Google, or Tencent.

Governments' ability to respond to the coming workforce transitions resulting from advanced automation is not just a question of coming up with smart policies. It involves recognising the technology's power to increase productivity in national economies and improve lives. Policymakers might not be able to fully predict the new activities and occupations that will emerge from our increased use of advanced automation—which jobs will stay and which roles might go away—but they can help create the conditions under which innovation and growth become more likely. ■

It will be incumbent on governments to introduce policies and practices that can help reduce the barriers to worker mobility.

Note

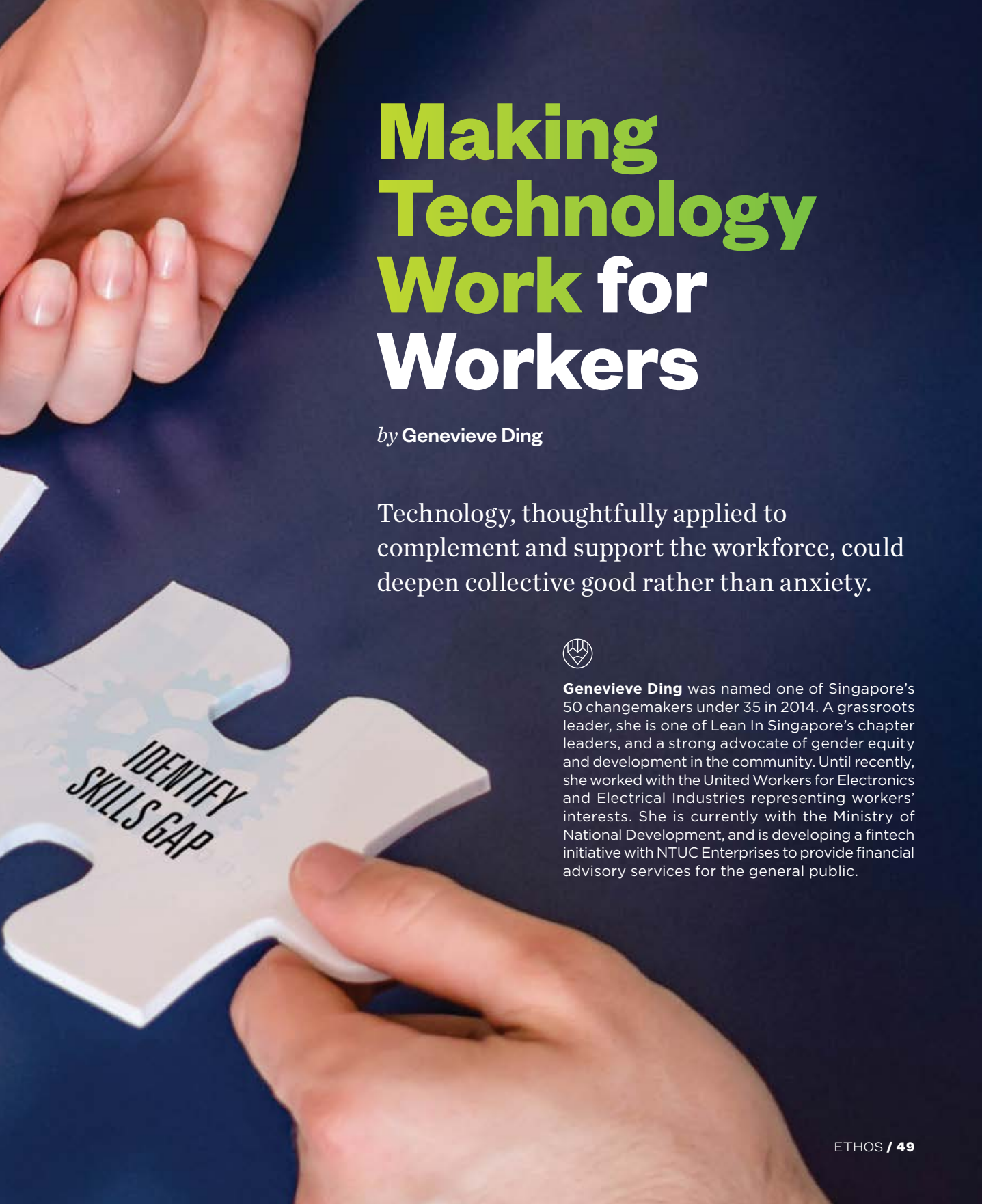
1. McKinsey Global Institute, "Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation", December 2017, www.mckinsey.com/newworldofwork.

LIFELONG LEARNING
DATA ANALYTICS
REAL-TIME TRAINING

Making Technology Work for Workers

by **Genevieve Ding**

Technology, thoughtfully applied to complement and support the workforce, could deepen collective good rather than anxiety.



Genevieve Ding was named one of Singapore's 50 changemakers under 35 in 2014. A grassroots leader, she is one of Lean In Singapore's chapter leaders, and a strong advocate of gender equity and development in the community. Until recently, she worked with the United Workers for Electronics and Electrical Industries representing workers' interests. She is currently with the Ministry of National Development, and is developing a fintech initiative with NTUC Enterprises to provide financial advisory services for the general public.

Auntie Sally is a union member at an electronics factory in Singapore producing wire bonds, the tiny wires in your mobile phone, tablet or step tracker that connect the semiconductor chip to its housing. A toothy lady with boundless energy and a knack for making you feel like her daughter, she has been in this job for 15 years. With no more than a primary school education, she began by operating the machines which make aluminum wire bonds, and has risen through the ranks to become a supervisor in her department. Recently, she was transferred to a new department, where she has to use software she does not understand. Frustrated and under immense pressure, she feels lost and fears that she may soon be let go. Once fiercely proud, her sense of self tied up so closely to the value she used to provide at work is now deflating. Worse still, her company's prospects are bleak because the process of wire bonding risks being entirely replaced by advances in materials engineering.

There have been many involved government policy discussion[1] on how rapid technological disruptions and the progress of artificial intelligence will inevitably displace workers like Auntie Sally along the entire value chain,[2] hollowing out the lower and middle classes. The pace of disruptive technologies makes it ever more difficult to train workers fast enough to transition to new jobs and sectors.

Underlying this trend is a deep, visceral and very real fear that the diligent, dutiful employee has of losing his job.

Can technology be used to tackle some of the very problems arising from its development?

Underlying this trend is a deep, visceral and very real fear that the diligent, dutiful employee has of losing his job. In part, this anxiety is reflected in global events, from the US elections and Brexit in 2016 to worldwide protests against Uber. The sheer potential impact of disruptive technology, adding to prevailing resentments about offshoring, could further deepen divides: between proponents who are able to extract benefit from it, and those who fear they may lose out.

There is plenty of literature on how we can harness technology to improve productivity in ways that make jobs easier, but risk displacing workers. The question is: In a technologically-enabled nation, *can technology be used to tackle some of the very problems arising from its development*? Could workers be involved not as mere spectators or recipients of help, but active players with a call to action, who can see for themselves the reality of a better, more hopeful life, who can make use technology to their advantage? Surely, workers would be more invested in the

adoption of emerging technology if they can see themselves jointly sharing in progress. How can technology play a role in mitigating job displacements and making workers more valuable? I suggest three approaches.

HELPING COMPANIES IDENTIFY THEIR SKILLS NEEDS

The faster technology develops, the more quickly workplace skills needed to stay ahead will evolve. This biggest challenge for the labour movement or HR professionals is how to keep up.

When speaking with companies, what surprises me is that they too often feel around in the dark for skills they will need in the future, before suddenly realising that they are already behind—leaving too short a runway to train workers. For instance, data science was a skill which suddenly came into demand, prompting companies to scramble to develop expertise. But for some time, many did not truly understand how data science could add real value in specific contexts, nor what specific skills were required: so job descriptions for data scientists had grandiose expectations—asking for "unicorns"—that were almost impossible to fill.

Technology has a role to play in helping both government and companies, especially smaller ones, better anticipate the changing skillsets needed to remain competitive. Data mining and analysis can trawl through thousands of online job descriptions to fish out skills that are trending in particular sectors, or even identify emerging skills across sectors which may give rise to new niche areas of growth. Once identified, companies are better able to start training workers as soon as possible—before their old skills become outmoded.

Technology has a role to play in helping both government and companies better anticipate the changing skillsets needed to remain competitive.

MATCHING SKILLS, ELIMINATING BIASES

Just as Tinder and Coffee Meets Bagel help people find their other halves based on users' preferences and profiles for a better fit, finding good matches between skills and skills in demand is essential to helping workers.

Algorithms, not unlike those that help you find a compatible date, have the potential to match job seekers to jobs based on skills, interests, aspirations, and cultural fit. At the same time, algorithms can help workers *identify skills gaps*[3] in their resumes—based on the skills most in demand or trending in job descriptions, and highlight training opportunities.

Finding good matches

between skills and skills in demand is essential to helping workers.

No clearer has skills matching through technology played out than with freelancers and the self-employed. While oft-cited as facilitating companies' reduction of full-time hires, the inevitable reality is that companies are increasingly prioritising hiring flexibility. Digital job portals like Upwork and Guru provide crucial project-based job opportunities and income for workers whose specific skills may not justify full-time hiring.

Digital labour platforms like LinkedIn or CareerBuilder also create more *transparent job markets* and disrupt previously closed labour markets by increasing workers' access to a wider variety of jobs and employers' access to a wider pool of job seekers, reducing the advantage of "old boys clubs", often driven by wealth and connections. Google's new built-in job search engine goes one step further to aggregate available jobs across major online job boards, using AI to rationalise among duplicate listings and letting workers shortlist jobs by location.

The playing field is levelled even further by technology platforms that *attenuate hiring biases* such as paper qualifications and gender, by enabling testing for the specific aptitudes required on the job. Platforms like Codility and GitHub help employers seek out and test the quality of actual coding and development skills, not certifications. Catalyst DevWorks' Catalyst Talent Platform[4] uses machine learning on thousands of variables from hundreds of thousands of individual engineer and developer candidates to identify innate capabilities and predict whether someone will be exceptional talent in the job, whether or not they have a degree or a good resume.

> Lifelong learning is much easier said than done.

REAL-TIME, REAL-WORLD TRAINING

Lifelong learning is much easier said than done.[5] Massive open online courses

(MOOCs) have already democratised learning, providing easy access to countless new courses and possibilities. However, much of this learning remains theoretical and does not train or test "on-the-job", so it is less useful for industries such as manufacturing.

Nor will upskilling necessarily get you a job. I've had the unenviable position of speaking to an electronics engineer who was retrenched. In tears, he related how he tried to take professional courses in the biomedical sector, with hopes of entering what was then one of Singapore's growth sectors. Despite his burnished qualifications, all the companies he approached felt that he did not have the job experience commensurate with someone else his age in the industry.

Virtual and augmented reality (VR and AR) open up new possibilities for "on-site", "hands-on" training, and might provide a solution to *learning that accelerates job transition*, enhancing meaningful skills acquisition throughout one's life. In manufacturing for instance, AR smart glasses that overlay computer-generated graphics and real-time instructions can *improve productivity without prior training*.[6] This will shorten the time required to induct new workers and close skills gaps.

Significantly, these upskilling technologies can also help companies "test" out potential employees during the hiring process in a simulated environment, assuring them that the job seeker—even if they did not have prior work experience—can perform to standard. Real-time, real-world training with AR will also *help existing workers learn continuously and at an accelerated speed*, increasing organisational learning agility.

Whither Government's Role?

Using technology to help mitigate the impact of job displacements can only be truly effective if *adopted at scale*. This can be challenging. For instance, identifying in-demand skills across sectors or on a national level, or skills matching through data analytics, will be most robust if there is open access to large volumes of job offerings on the demand side. The more source data available, the more transparent the market.

> Using technology to help mitigate the impact of job displacements can only be truly effective if adopted at scale.

However, much of this information is fragmented across various platforms and job portals—with a significant proportion of hiring still done through personal referrals or head-hunters. Governments are best placed to address this by facilitating greater job data sharing, not only from the perspective of supply but also of demand. National job portals,

where all employers are required to list job openings with job descriptions and skills needed—such as Singapore's national online Jobs Bank—would go some way to open up demand-side data. Analyses of data aggregated across job centres such as the Employment and Employability Institute and grassroots' Job Placement Centres can then offer a more comprehensive picture, not just of jobs sought but skills available on the supply side. This *skills marketplace* would also help Government, companies and workers identify skill gaps.

Technologies such as VR and AR for training are most impactful if they can both be customised and scaled up. In the near term, cost constraints and access to these technologies will limit their scalability. Governments could view these technologies not only as training tools but also as productivity enablers, when considering funding incentives.

Less quantifiable skills such as learning agility or strategic thinking may not be as easily evaluated through mediated platforms.

Technology will also affect various constituents to differentiated degrees. Eliminating biases through Codility or GitHub, for example, is limited to skills that are more quantifiable and thus demonstrable on a platform. Less quantifiable skills such as learning agility or strategic thinking may not be as easily evaluated through mediated platforms. These challenges are more tricky to address and certainly worth a separate discussion. Programmes such as Singapore's Career Support Schemes and other work trials aim to cut through some of this opacity, but these are limited to older workers and the longer-term unemployed, and may lead companies to "discount" these workers' value or deter companies from signing up to begin with, because they know support is time-limited.

More generally, Singapore could rethink and structure unemployment benefits in the context of more frequent gaps in employment and shorter employment cycles, while facilitating a more flexible labour market. [*See "Trends and Shifts in Employment: Singapore's Workforce" by Augustin Lee, page 56 of this issue.*]

Technology as a Force for Social Resilience and Collective Progress

The discourse on technology disruption often takes on the complexion of inevitability. While disruption will happen, that workers will be worse

Technology disruption often takes on the complexion of inevitability. While disruption will happen, companies and governments can be more thoughtful about why and how they implement technologies.

off is not a foregone conclusion. Companies and governments can be more thoughtful about why they implement technologies, make better choices on which technologies to implement, and how these technologies are implemented. Throughout history, human progress has been defined by the choices that we have collectively made. By choosing *technologies that best complement our workers* instead of those that are simply the hottest or ostensibly most cost-effective, technology can be a force for collective progress. We would do well to think about how best to incentivise these choices sooner rather than later.

By deliberately harnessing technologies in these ways, we will be negotiating a new narrative: one that empowers workers and shows them that they too have a stake in our collective progress. Technology then no longer divides, but instead buttresses society's resilience. It would offer Auntie Sally a vision of progress that she can once again take pride in contributing to and being part of. ■

An earlier version of this article first appeared on the blog Technology and Public Good.[7]

Notes

1. See, for example: Kristin Lee, "Artificial Intelligence, Automation, and the Economy", December 20, 2016, accessed May 5, 2017, https://obamawhitehouse.archives.gov/blog/2016/12/20/artificial-intelligence-automation-and-economy.
2. David Rotman, "How Technology Is Destroying Jobs", *MIT Technological Review*, June 12, 2013, accessed May 5, 2017, https://www.technologyreview.com/s/515926/how-technology-is-destroying-jobs/.
3. Tang See Kit, "Faster, Better Job Matches? Singapore Start-ups Look to Redefine Career Searches", *Channel NewsAsia*, April 25, 2017, accessed May 5, 2017, http://www.channelnewsasia.com/news/business/faster-better-job-matches-singapore-start-ups-look-to-redefine-8787100.
4. Catalyst IT Services, "Catalyst Talent Platform", accessed May 5, 2017, http://50.87.21.18/content/catalyst-talent-platform.
5. "Equipping People to Stay Ahead of Technological Change", *The Economist*, January 14, 2017, accessed May 5, 2017, http://www.economist.com/news/leaders/21714341-it-easy-say-people-need-keep-learning-throughout-their-careers-practicalities.
6. Magid Abraham and Marco Annunziata, "Augmented Reality Is Already Improving Worker Performance", *Harvard Business Review*, March 13, 2017, accessed May 5, 2017, https://hbr.org/2017/03/augmented-reality-is-already-improving-worker-performance.
7. Karen Tay, "Technology and Public Good", accessed May 5, 2017, https://techandpublicgood.com/.

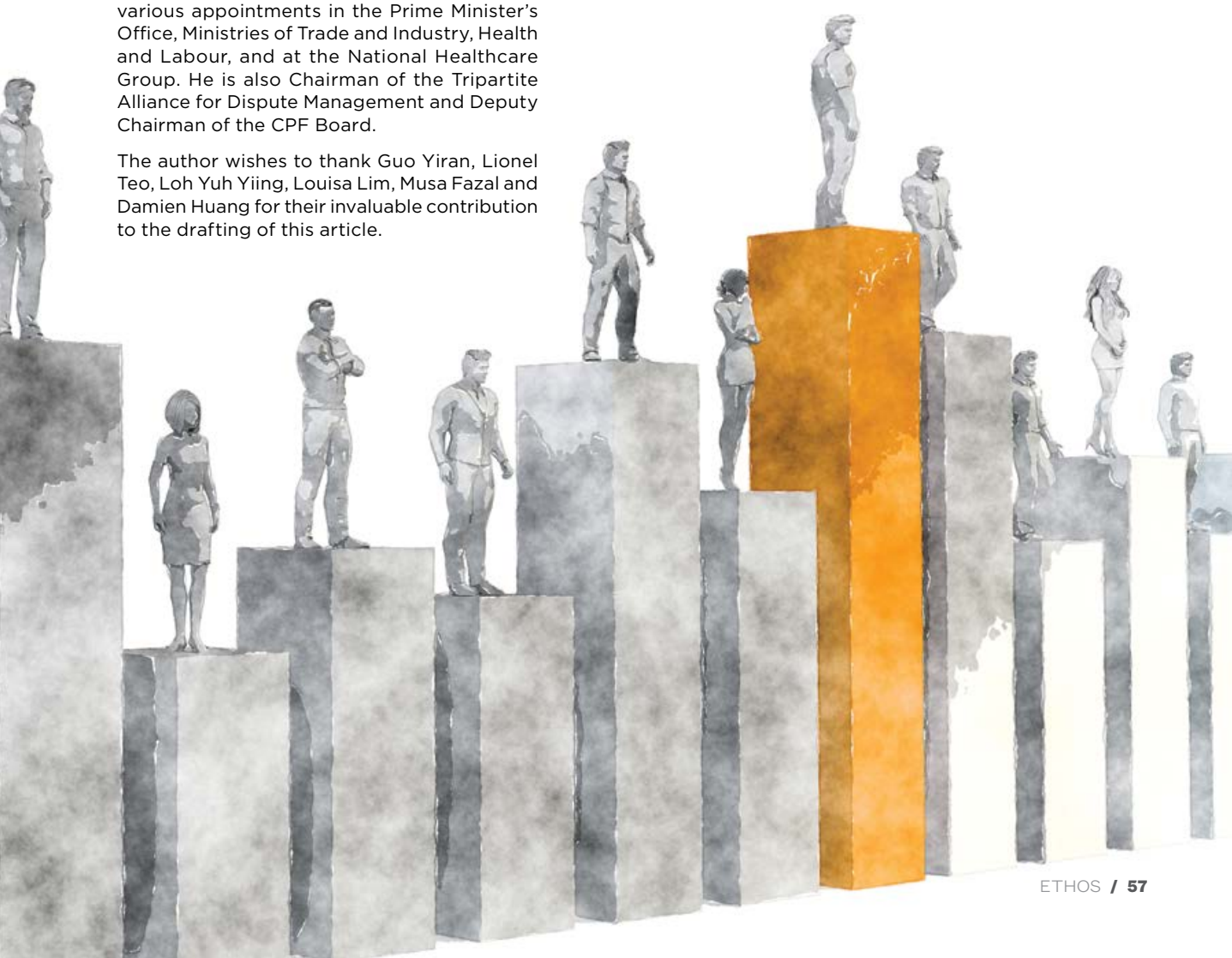
Trends and Shifts in Employment:
Singapore's Workforce

by **Augustin Lee**

Worldwide shifts in employment patterns may challenge the assumptions underlying current manpower policies.

Augustin Lee is Deputy Secretary at the Ministry of Manpower. With more than 20 years' experience in public policy and administration, he has held various appointments in the Prime Minister's Office, Ministries of Trade and Industry, Health and Labour, and at the National Healthcare Group. He is also Chairman of the Tripartite Alliance for Dispute Management and Deputy Chairman of the CPF Board.

The author wishes to thank Guo Yiran, Lionel Teo, Loh Yuh Yiing, Louisa Lim, Musa Fazal and Damien Huang for their invaluable contribution to the drafting of this article.



Technological advancements and changing social norms are significantly altering the nature of work. Disruptive innovations have resulted in more jobs being displaced and more frequent bouts of involuntary unemployment. Digital platforms have made the coordination of components of work more seamless, timely, and convenient, thereby allowing work tasks to be unbundled. Such micro-jobs offer opportunities for workers to earn supplemental income, but come with less job security. Employers that value operational flexibility may favour contingent workers and reduce their core of permanent staff to optimise labour costs. Individuals are likely to experience more frequent career transitions across companies, sectors, and even types of employment, as new

A multi-agency approach

The "Future of Work" is a broad and complex topic, and major streams of work are on-going. In response to technological and economic disruptions, economic agencies and the Committee on the Future Economy (CFE) are looking into future areas of growth, job creation, and helping companies cope. The Ministry of Education (MOE) and SkillsFuture Singapore (SSG) are identifying the skills and training needed to keep Singaporeans relevant. At the intersection of jobs and skills are the Ministry of Manpower (MOM) and Workforce Singapore (WSG), which match individuals with the right skills to the right jobs.

While Singapore has not experienced a decline in the share of permanent employment, workers may see a gradual shift away from the traditional model of lifetime employment.

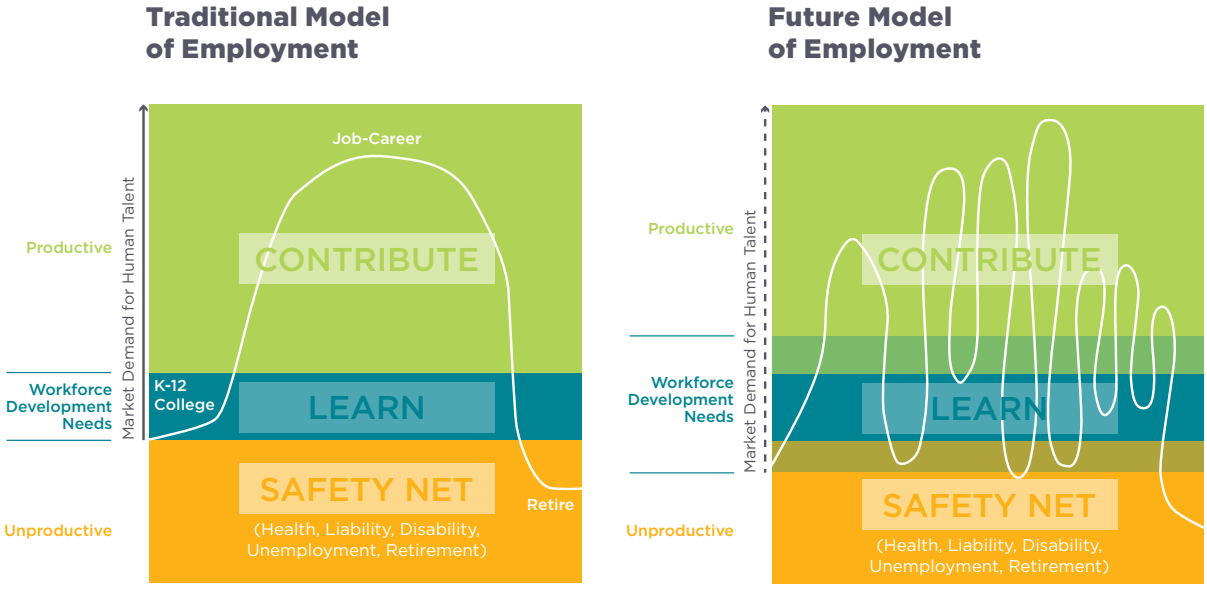
Workers will have to get accustomed to the prospect of less permanent and more fluid work arrangements throughout life.

job opportunities emerge and existing jobs are redesigned. Workers will have to get accustomed to the prospect of less permanent and more fluid work arrangements throughout life.

How We Organise Ourselves for Work Is Changing

Recent statistics suggest that traditional permanent employment globally is fracturing. Meanwhile, alternative work arrangements such as contract-based employment, freelancing and self-employment[1] are on the rise in the US, Europe, and Asia. Nearly one in four Europeans work independently,[2] while one-third of Americans have done freelance work in 2015 alone.[3] These trends are partly attributable to domestic labour market conditions, where a lack of viable permanent alternatives following the global financial crisis has resulted in elevated unemployment rates—particularly among youths—amidst a structural decline in labour force participation rates.[4] Strong employment protection legislation for traditional employees in Europe also makes non-traditional workers relatively less costly and more attractive.[5] The increase in non-permanent employment can manifest itself in different forms: while the UK has seen a rise in self-employment, the US and Germany have mainly experienced increases in term contract employment at the expense of permanent employment.

While Singapore has not experienced a decline in the share of permanent employment, workers may see a gradual shift away from the traditional model of lifetime employment. In future, we expect more transitions in and out of employment and learning during adulthood. Workers may move between different jobs, work arrangements, and even careers, punctuated by periods of unemployment or training (see Figure 1).



Source: @heathermcgowan and www.futureislearning.com

Figure 1. Comparison of Traditional and Future Models of Employment

Why has there been a shift away from traditional employment?

i. Workers are more likely than before to work for multiple employers in their lifetime. While some do so voluntarily in search of better opportunities, others are forced to do so due to displacement arising from tech advancements, economic restructuring and/or shorter business cycles.

ii. The emergence of digital platforms is making it easier for individuals to freelance, whether as a primary or secondary source of income.[6] The growth of freelancing in and of

itself brings potential efficiencies to the economy, better experiences to consumers, and increases the range of choices available to the worker including job options that offer greater flexibility and autonomy and a source of supplemental income.

iii. Unbundling of jobs into disaggregated tasks, is becoming more commonplace. This trend can be traced back to the 1970s with the rise of outsourcing and contracting. Technology has fuelled the trend, by allowing jobs to be deconstructed and constituent tasks outsourced. A Mowat Centre report, for example, claims that work is being reduced: from lifelong to full-time or part-time jobs; from contract jobs to project jobs; and from task-based jobs to micro task-based jobs. Eventually we may transition to hybrid tasking paired with artificial intelligence or complete automation. In the process each reduction in job scope is associated with a decrease in pay for workers. Hence, as jobs are unbundled, workers may see their wages fall, and over time they may even lose their jobs altogether.[7]

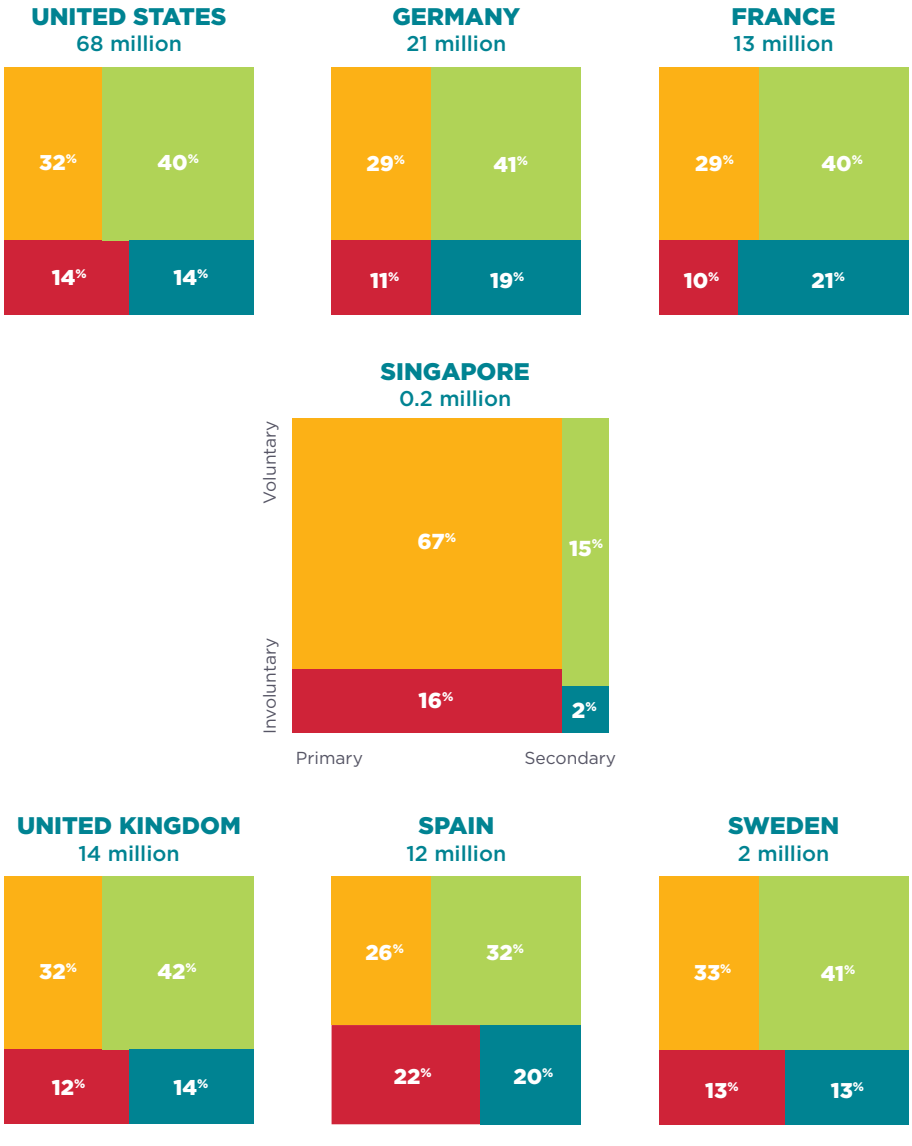
Many of our existing policies have operated on the assumption of employer-employee relationships as the norm. As a result, many freelancers fall outside some of our social safety nets.

The Freelancing Phenomenon

The freelancing phenomenon or gig economy has captured significant attention globally. Freelancing can be seen as healthy as long it is voluntary and chosen by workers due to the inherent merits of the job (e.g., flexibility and autonomy) rather than due to labour market inequities (e.g., disadvantaged working conditions that make freelancers cheaper than permanent employees).

In Singapore, 82% of all freelancers do so by choice, a much higher proportion relative to other developed countries (see Figure 2). However, these proportions may change over time.

Figure 2. Proportion of Primary and Secondary Freelancers/Independent Workers Who Do So Voluntarily



Notes

1. Figures for Singapore are from Supplemental Labour Force Survey 2016 and refer only to freelancers.
2. Figures for other countries are from McKinsey Global Institute's 2016 report, "Independent Work: Choice, Necessity, and the Gig Economy" and refer to independent workers, which is a broader group compared to freelancers.
3. Figures below country headers denote number of such workers in each country.

Preparing for the Future of Work

The changing work landscape calls for new perspectives and responses to work and the organisation of work. At the same time, Singapore should continue to hold steadfast to three principles:

a. First, *our ongoing strategy must be to keep the labour market flexible, tight, and responsive*.

b. Second, we must continue *to pro-actively invest in skills upgrading, lifelong learning, and to facilitate employment efficiently and effectively*.

c. Third, we *should not and cannot stop the rise of digital platforms and the "gig" economy*, such as represented by platforms like Uber and Upwork.

Concurrently, we need to build anticipatory capacity to understand how future work arrangements will impact workers and society, and take steps to prepare ourselves for them. Going forward, disruptions to work arrangements are likely to have more frequent and deeper effects on *all* workers, including permanent employees, term contract employees, as well as primary and secondary freelancers. Many of our existing social and economic policies have operated on the assumption of employer-employee relationships as the norm. As a result, many freelancers fall outside some of our social safety nets. To address this, we will need to consider two key challenges:

- **Enhancing social security and basic worker protections for freelancers:** How can we bring freelancers into our policy architecture so that social security, worker protections and other social and economic policies are extended to freelancers?

- **Ensuring industrial harmony amidst changing labour arrangements:** Job instability can weaken our social compact and undermine social cohesion; how can we extend measures to ensure industrial harmony with freelancers?

Enhance Social Security and Basic Worker Protections for Freelancers

New models of work are prompting changes to the traditional employer-employee relationship. The shift away from employer-employee relationships drives a wedge through our existing social and economic policies, which have been tied to the conventional idea of permanent employment.

Over time, more workers may take on either primary or secondary freelancing, or both, at some point in their lives. We may need to relook our social security and worker protection laws to ensure a basic level of assurance for such freelancers. In doing so, our intention should not be to shield freelancers from market risks, such as volatility in the volume of work or from competition, or from new digital ways of sourcing for work. Neither should we import wholesale the full suite of employee protections that are in place, such as over-time and rest-day protections. Nonetheless, freelancers deserve basic protection from non-market risks, no different from traditional employees.

In particular, savings for healthcare, housing, and retirement are as important for freelancers as traditional employees. To do this, however, we first need to better enable the collection of Medisave contributions by Self Employed Persons (SEPs), almost a quarter of which lapse today.[1]

> OUR INTENTION SHOULD NOT BE TO SHIELD FREELANCERS FROM MARKET RISKS.

Leverage on a National Platform for Job Payments and Policy Implementation

A key problem freelancers face today is timely payment for their services. This affects downstream cashflows, particularly for one-person setups in industries like media and copywriting. Written contracts would help, as would affordable mediation services. Also, a national platform to track the collection and payment of these invoices would enable freelancers to better manage their cashflows and financial obligations.

Furthermore, a wide range of public services are means-tested today. To reduce the administrative burden on the Government to validate each application and appeal individually, a national platform could enable freelancers and other SEPs whose incomes are not otherwise captured to become eligible for schemes such as Workfare, housing grants and loans, education bursaries, childcare and kindergarten subsidies. NSMen and parents with young children who are SEPs would no longer need to file their income claims manually when applying for makeup pay and government paid maternity/paternity leave. In addition, primary freelancers could become eligible for government grants targeted at employers.

NONETHELESS, FREELANCERS DESERVE BASIC PROTECTION FROM NON-MARKET RISKS, NO DIFFERENT FROM TRADITIONAL EMPLOYEES.

Work Injury Insurance Coverage for Freelancers

A unique feature of the "contract for service" model is that freelancers have significant autonomy and control over how the service is performed. Because corporate service buyers and intermediaries, unlike employers, do not traditionally exercise significant control over how freelance work is performed, freelancers are excluded from the protections accorded by legislations such as the Employment Act, Employment Claims Act, and Work Injury Compensation Act. Freelancers generally accept such a tradeoff because they value the autonomy of determining which jobs and assignments to accept. While some workers are misclassified as freelancers, their concerns can and are being addressed by existing programmes such as WorkRight.[2]

One major pain point of freelancers is their exclusion from the Work Injury Compensation Act despite being subjected to similar work injury risks as regular employees. Freelancers who are injured in the course of their work do not receive paid medical treatment, have to dip into their own savings during

the period they are unable to work, and will not receive any compensation for loss of future earnings arising from any permanent incapacity.

Instead of having service buyers of different sizes purchase various insurance types for individual freelancers, one approach could be for freelancers to be insured themselves, before they can bid on contracts. Freelancers may work for many different service buyers or platform intermediaries with (often concurrent) contracts of varying size and duration, and this would be a more practical approach. This also levels the playing field amongst freelancers and ensures that they do not under-cut each other to win contracts on the basis of risk-appetite in relation to work injuries.

> FREELANCERS SHOULD ALSO BE ALLOWED TO BENEFIT FROM THE COLLECTIVE REPRESENTATION THAT TRADE UNIONS PROVIDE.

Ensure Industrial Harmony amidst Changing Work Arrangements

Singapore has enjoyed a long track record of industrial harmony. To remain relevant, tripartite partners will have to expand their representation coverage beyond existing constituents as work arrangements change and worker profiles shift to include freelancers.

One area that we may have to consider in the future is whether freelancers should also be allowed to benefit from the collective representation that trade unions provide. This is so that freelancers would not have to bear the responsibility of negotiating work terms on their own, and face asymmetrical bargaining power with service buyers. ■

Notes

1. Based on CPFB's data on registered SEPs who are liable for Medisave contributions as at 31 December 2016 (i.e., have outstanding MA liabilities and earn annual net trade income above $6,000).
2. Ministry of Manpower, "WorkRight: Know Your Employment Rights", November 22, 2017, accessed December 12, 2017, http://www.mom.gov.sg/employment-practices/employment-act/workright.

Notes

1. Sarah A. Donovan, David H. Bradley, and Jon O. Shimabukuru, "What Does the Gig Economy Mean for Workers?", Congressional Research Service, February 5, 2016, accessed November 22, 2017, https://www.fas.org/sgp/crs/misc/R44365.pdf.

2. Euro Freelancers, "EU Affairs Freelancers Association", accessed November 22, 2017, http://www.euro-freelancers.eu/eu-affairs-freelancers-association/.

3. Upwork and Freelancers Union, "Freelancing in America: 2015", accessed November 22, 2017, https://www.upwork.com/i/freelancing-in-america/2015/.

4. Eurofound, *Recent Developments in Temporary Employment: Employment Growth, Wages and Transitions* (Luxembourg: Publications Office of the European Union, 2015), accessed November 22, 2017, https://www.eurofound.europa.eu/sites/default/files/ef_publication/field_ef_document/ef1557en.pdf.

5. COEURE, "EU Dual Labour Markets: Consequences and Potential Reforms", June 8, 2015, accessed November 22, 2017, http://www.coeure.eu/wp-content/uploads/EU-Dual-Labour-Markets1.pdf.

6. Secondary freelancers include regular employees who moonlight on the side, or students, housewives or retirees who may wish to fill idle hours and supplement their income. Secondary freelancers constitute only 17% of all freelancers in Singapore. But their numbers may grow if fluid work arrangements become more prevalent.

7. Sunil Johal and Jordann Thirgood, "Working without a Net: Rethinking Canada's Social Policy in the New Age of Work", Mowat Centre, accessed November 22, 2017, https://mowatcentre.ca/working-without-a-net/.

Public Value through Private Partnerships: **The Grab Story**

by **Zafrul Hashim**

A five-year-old technology platform is harnessing public, corporate and individual partnerships to transform urban Southeast Asia.

Zafrul Hashim is Regional Legal and Public Affairs Head at Grab.

ABOUT Grab

Founded in 2012, Grab is Southeast Asia's leading on-demand transportation and mobile payments platform.* Headquartered in Singapore, Grab has expanded into more than 168 cities in eight countries across Southeast Asia.

*According to TNS, a global market research firm, Grab's services (taxis, cars and motorbikes) are used most often in Singapore, Indonesia, Malaysia, Philippines, Thailand and Vietnam, compared to other ride-sharing and hailing apps.

GRAB BY THE NUMBERS

Over
77 MILLION
mobile downloads

Over
2.3 MILLION
drivers

Solving Real Problems through Its Social Mission

Grab's vision is to drive Southeast Asia transportation forward and transform the region's mobile internet ecosystem. Our social mission in transport is to provide safe, reliable and accessible transportation options to connect people to places where they work, live and play. Grab uses technology to improve the efficiency and cost-effectiveness of these options, offering viable alternatives that can encourage people to give up their cars, contributing to Singapore's car-lite vision.

With its advanced digital infrastructure and ambition of becoming a Smart Nation, Singapore has provided a good testbed for experimenting with new multi-modal transportation solutions and payments platforms.

All Grab products and features are planned and managed out of the Singapore R&D centre, which is the largest of our six R&D centres (the other five centres are located in Beijing, Bangalore, Jakarta, Ho Chi Minh City and Seattle).

Providing Transport Options for All Budgets

Since entering the Singapore market, Grab has worked with the government to apply technology to provide affordable, safe and convenient commuting options. Such options maximise the use of each vehicle to get people from point to point, and complement Singapore's public transportation system by serving the first and last mile journeys of commuters. For example, Grab launched the GrabShuttle service in March 2017 (in partnership with GovTech in Singapore) to serve relatively inaccessible areas, such as Tuas, Changi industrial estates, and Sengkang–Punggol, with more direct routes, and at a lower price point.

Plugging the Cashless Payments Gap

Grab is now focusing on solving the next big, meaningful tech problem in Southeast Asia: to make cashless transactions possible for everyone. Grab already has a substantive base of transport users who use our app to book—and pay for—their daily commutes. Southeast Asia is still a largely cash-based transaction economy. A large proportion of the region's 620 million people remain unbanked, with the World Bank noting that only 27% have a bank account, while only 9% of adults have a credit card.

A study commissioned last year by the Monetary Authority of Singapore (MAS) and conducted by business consultancy KPMG showed that in Singapore, cash formed more than 80% of payments at small shops and neighbourhood stores, and about 90% at hawker centres and wet markets.

Grab first launched GrabPay Credits in November 2016, allowing everyone in Singapore with the Grab mobile app to make payments for rides taken through a cashless stored value option. Today, GrabPay has expanded beyond the realm of transportation. Users—beginning with those in Singapore—can transfer money to one another, and use GrabPay as an e-wallet to pay for food and services in hawker stalls, restaurants and shops. We are focused on helping cash-based businesses in Singapore go cashless, giving them access to new customers in an easy and affordable way.

With Singapore as a testbed, we look to work with public and private sector organisations to scale the GrabPay e-wallet across Southeast Asia in 2018.

Creating Public Value through Partnerships

As our portfolio of operating locations and services grows, Grab continues to prioritise community welfare—going beyond drivers and passengers to helping governments and local communities at large. Grab's approach is collaborative: for example, helping governments think about how ride-hailing regulations should come into effect, based on what the local infrastructure needs are. In turn, governments appreciate that we are aligned to their policy agendas and that we work together to provide long-term solutions.

One example of this is our contribution to the World Bank's OpenTraffic initiative in Manila, Cebu and Kuala Lumpur.

SHARING TRAFFIC DATA TO AID PLANNING

OpenTraffic provides traffic management agencies and city planners with access to open datasets so they can better manage traffic flow, make investment decisions on local transport infrastructure, and take a more data-driven approach to urban planning.

Under the OpenTraffic initiative, Grab provides aggregated, anonymised traffic data from its drivers' real-time GPS data streams. Provided at no cost to governments via an open data license, local government agencies can use this data to enhance existing traffic management systems, such as optimising traffic light control and coordination, in order to address traffic congestion and improve road safety.

OpenTraffic has enabled the Philippines to make a number of enhancements, such as improvements in traffic signal times along the primary west-east arterial in Cebu City, without additional infrastructure investment. Easing city congestion during peak hour traffic helps reduce carbon emissions, saves commuters time from less traffic congestion, and moves Southeast Asia towards better and smarter cities.

Supporting Local Communities

Besides providing a safe, convenient and accessible transportation platform for Grab users and ensuring Grab driver-partners continue to earn sustainable incomes, we constantly look for opportunities to contribute back to local communities in the markets where we operate.

When a study in Manila indicated that Grab driver-partners remitted their earnings to their partners, and that nine out of every 10 housewives were ill-equipped to manage the money remitted by their Grab driver-husbands, Grab Philippines launched Grab Academy for them. The goal: empowering and educating the wives to manage their husbands' income well, and at the same time enabling them to start their own businesses.

Over 1,000 housewives of our driver-partners attended the one-day Grab Wives Academy programme, organised in partnership with Unionbank, Lendr, Avon, Sunlife, Angat Pilipinas, and Generika Drugstore. Thereafter, hundreds of housewives are now direct sellers for Avon and are actively contributing to their household income.

Across the region, Grab drivers earn 35% more than the average wages—most of which is spent on supporting their families and sending their children to school. Grab's driver-partners in Singapore are entitled to exclusive fuel discounts to keep costs low, a free Personal Accident Insurance plan for greater peace of mind, and Medisave contributions to save up for future medical needs.

To supplement the education of their driver-partners' children, Grab launched GrabSchool—an enrichment workshop to develop entrepreneurship and innovation skills. Over 1,000 children have benefited from this. Going a step further—in Vietnam—Grab also granted 35 scholarships, and donated gifts and cash for underprivileged people amounting to VND 140 million in 2017.

To improve road safety[1] with better vision,[2] Grab partnered with Essilor in 2017 to provide driver-partners in the region with free eye-screening and access to quality low-cost eyewear. For example, a vision booth was set up in Grab's Driver Centres in Yangon and Jakarta, where hundreds of drivers have had their eyes screened and are now equipped with quality spectacles for improved vision.

Grab also uses technology to correct driving behaviour of their driver-partners. In Singapore for example, the use of telematics has improved driving behaviour by nearly 35%. In-car cameras are also installed and distributed at a subsidy to Grab-driver partners in Malaysia, and drivers are trained on emergency skills including first aid, CPR and AED.

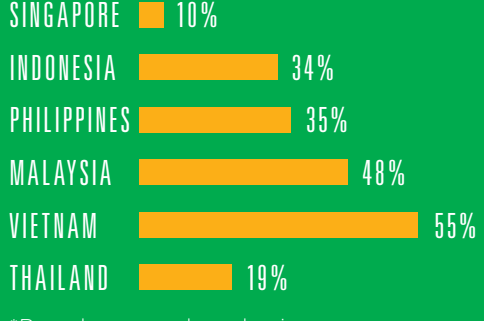
DIGITISATION: TRANSFORMING LIVELIHOODS

1 IMPROVING DRIVER PARTNERS' EARNING POTENTIAL

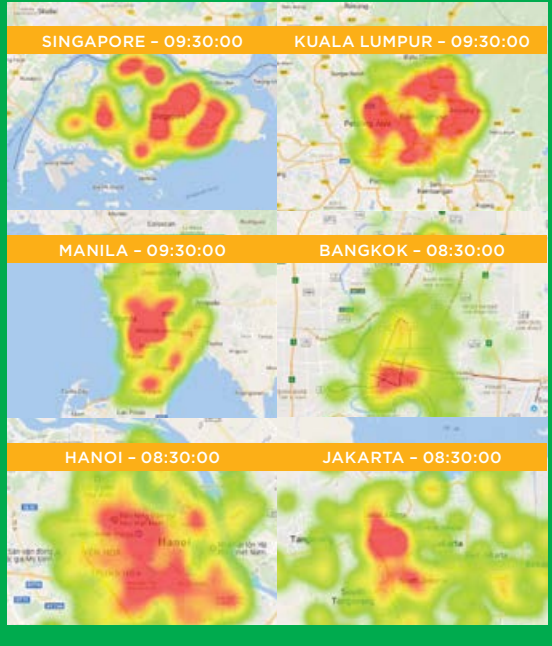
Grab drivers are "partners": not workers nor contractors. Grab wants them to have a way to earn enough to have options in life.

There are now more than 2.3 million driver-partners on the Grab platform. They earn on average one-third (35%) more on a per hour basis compared to average worker wages across all of Grab's markets.

How much higher driver-partners' incomes are, compared to average wages*



*Based on a per hour basis



Grab Demand Heat Map
Using technology to optimise the supply of driver-partners in our cities: Grab's driver app displays demand heatmaps, which indicates areas with high passenger demand. These enhancements bring 12.9% more jobs for driver-partners.

2 AIDING FINANCIAL AND DIGITAL INCLUSION

With 70% of Southeast Asians still lacking basic internet access, the Grab app (along with Grab microfinanced phones) has made it possible for many driver-partners to experience the power of the internet for the first time—bridging the digital divide. Grab has assisted in opening bank accounts for more than two-thirds of its driver-partners, introducing them to banking and other financial services for the first time in their lives. Nearly 2.3 million driver-partners now rely on the Grab platform for their household income.

To improve their welfare and encourage driver-partners to save for long-term needs, Grab in Singapore matches qualifying driver-partner's Medisave contributions by up to $200.

Over and above the paid medical health checks Grab covers, as part of the PDVL[1] application process, Grab also provides driver-partners with personal insurance at no cost: a benefit enjoyed by GrabCar driver-partners and GrabHitch passengers in 168 cities across eight countries.

Number of unbanked driver-partners Grab has brought into the banking system across Southeast Asia

ALMOST

1 MILLION

3 UPSKILLING

Grab's driver partners are leading the change in the new gig economy. Like any entrepreneur, whilst they enjoy flexible working hours, they need to refine their skills: to be able to speak English fluently, drive safely, learn how to read maps and use smartphones.

In the past, Grab supported driver-partners by microfinancing smartphones; today it offers similar options for cars. In some markets, including Singapore, they can sign up for English-speaking classes, or learn how to manage elderly passengers.

Such skills support drivers by helping them to enhance their customer service and improve customer ratings, boosting their earnings.

Number of Grab driver-partners on the roads every day, equipped with emergency lifesaving skills and ready to serve as first responders in medical emergencies

1,300+

4 PROVIDING SAFER COMMUTES

On average, Grab commuters reach their destinations in less than half the time (52% reduction in travel time on average) compared to public transport options in their cities.

To design safety into its technology, Grab invested in telematics, to measure how safe Grab drivers are on the road. Personalised weekly 'report cards' are sent to all driver-partners in Singapore to highlight driving safety issues, e.g., their rate of braking or speeding. In trials, Grab found that this helped drivers reduce their reported driving safety issues by as much as 35%.

In addition to this, Grab trains drivers in emergency skills such as first aid, CPR and AED, through partnerships with the International Federation of Red Cross and Red Crescent Societies. It equips drivers with defensive riding skills and road safety techniques. This has kept traffic accident rates from Grab *five times lower* than national averages.

Number of GrabBike driver-partners trained in Defensive Riding techniques

135,000+

5 AIDING CLEANER AND MORE EFFICIENT CITIES

Grab's two flagship carpooling services—GrabShare and GrabHitch—are helping to address pollution and congestion in Southeast Asia.

Grab saves an estimated 3.2 million kilograms in carbon emissions every year, by offering carpooling options and further optimising the booking system. This is equivalent to the amount of CO_2 emitted to power 9,268 desk lights—kept on 24/7 for a year!

In Singapore, through a partnership with SMRT, Grab's fleet will include eco-friendly hybrid and fully electric vehicles for an improved driving experience, while reducing drivers' operating costs and minimising the impact on the environment even further.

Cars removed from the roads*

16,000

*In cities with GrabShare and GrabHitch

Carbon emission saved

3,166,353 KG

Since its launch in December 2016, GrabShare has covered

8 MILLION RIDES

72 MILLION KM

(or 187 trips to the moon!)

Note

1. The Singapore Land Transport Authority (LTA) has mandated that all private hire car drivers need to be properly licensed with a PDVL (Private Hire Car Driver's Vocational Licence). Grab supports its valued driver-partners in their application process to obtain the PDVL by absorbing costs and handling application logistics.

Regulators Can Create a Conducive Environment for Innovation

The Singapore government has been helpful in providing space for initiatives to be launched, without rushing to impose regulations at the onset. For example, when Private Hire Cars (PHCs) were launched in Singapore, the government did not ban or regulate it outright, unlike what was done in some cities in other countries. Instead, they adopted a wait-and-see approach. They gave time for these developments to play out, so their effects could be fully analysed. A similar approach was taken by MAS with its regulatory sandbox for Fintech innovation, which was helpful when GrabPay—Grab's proprietary payments platform—was being developed to facilitate cashless payments.

> Lack of regulation does not mean no oversight. When regulators engage closely with private players, it provides opportunities for discussion around issues of concern.

It helps when regulators are more open to engaging closely with industry players. Partnership is a two-way process: it allows industry to be sensitised to public considerations (e.g., safety in the private car hire sector) while allowing local governments to understand the rationale behind seemingly controversial initiatives that private players may push.

Lack of regulation does not mean no oversight. When regulators engage closely with private players, it provides opportunities for discussion around issues of concern. At Grab, we welcome these

opportunities to work collaboratively with regulators to solve problems together. A good example of this in action was when LTA opened the PDVL application process for PHC drivers. Grab provided inputs on what they could do collectively to design a smooth process for their driver-partners. Similarly, they are now engaging more closely with MAS on plans for GrabPay, to ensure that they can meet all relevant regulatory requirements to create a safe and secure payments system that will ultimately result in building deeper consumer trust.

The new digital economy thrives on timely, accurate and meaningful information. With the right use of technology, availability and applicability of good data and effective partnerships in place, we can go about our daily lives with greater ease, comfort and convenience—and everyone benefits. This should be our shared goal: working together across sectors to ensure that the needs of people are well taken care of and creating shared value. Grab is committed to help make this happen in Southeast Asia's dynamic cities. ■

Notes

1. According to the 2006 World Health Organisation report, poor eyesight of road users is the main risk factor for road accidents.
2. Boston Consulting Group has found that 36% of Asian drivers have uncorrected vision.

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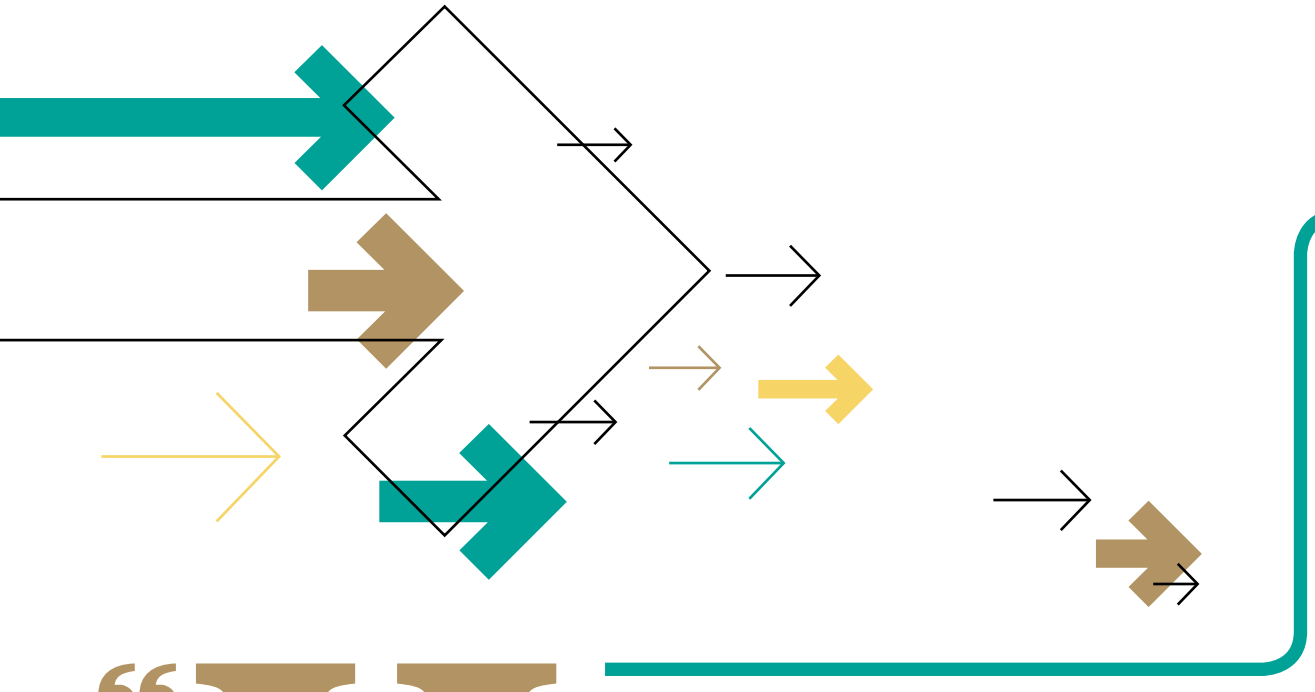
Navigating the New Economy:

A FUTURE THAT WORKS

by **Andrea Phua**

Success in a changing world will demand more than technical skills: it will call for adaptability, empathy and a deeper sense of meaning.

Andrea Phua is Deputy Director at the Ministry of Trade and Industry, where, in addition to her role as the Secretariat to the Committee on the Future Economy, she has served in various capacities to support the internationalisation of Singapore companies, manage Singapore's economic relationship with North America, and most recently, negotiate the Trans-Pacific Partnership free trade agreement. Prior to this, she taught English Literature and worked on education policy at the Ministry of Education.



"Here, you look like you need this."

I looked up from my work station and came eye to eye with a steaming cup of hot coffee, attached to a hand.

This hand did in fact belong to a person: my office neighbour whom I had not spoken to for days. Although we worked in the same division, our assignments took us into different meetings in different buildings, sometimes even different countries for stretches at a time.

I gratefully received her offering of sustenance before turning back to my computer.

In 2016, I was the Secretariat that staffed the Committee on the Future Economy (CFE), a sprawling national effort co-chaired by Minister of Finance Heng Swee Keat, and Minister for Trade and Industry S. Iswaran. Together with several other Ministers, as well as senior leaders from the public and private sector, we studied the pressing economic challenges today that would affect Singapore tomorrow, in order to present policy responses to help our industries, people and government to prepare for the future. Over 16 months, the Committee consulted over 9,000 stakeholders, including trade associations and chambers (TACs), public agencies, unions, companies, executives, workers, academics, educators, and students.

In Singapore, economic master-planning of this scale takes place every five years or so, often on the back of a significant event—such as SARS, or the Global

Financial Crisis. The "crisis" confronting the CFE, however, was less to do with a national disaster than disruption on a *global* scale. New technologies were poised to fundamentally change traditional means of operating. Be it e-commerce and government services provided over the Internet, or robotics and 3D printing disrupting traditional manufacturing supply chains, or emerging technologies such as artificial intelligence: it was timely for both the private sector and government to think hard about our responses to the resultant challenges and opportunities, particularly with respect to jobs in the future.

The potential impact of technology has been much discussed by experts elsewhere. Suffice to say, the future of work is not some science fiction dystopia where machines take over man and the human race is displaced or destroyed. Technology will remain very much a tool to enable the design and production of better goods and services that will benefit people: a supplement to, rather than a supplanting of. But how might governments and policymakers, when thinking about the future of work, respond to help people harness more quickly and broadly the benefits of technology and globalisation? I will share some perspectives arising from my experience as the CFE Secretariat.

The Changing Nature of Work: Tasks, Not Titles

The future of work will no longer be defined by organisational structures. Instead, work will increasingly be about tasks, and how we organise ourselves around performing those tasks together. TaskRabbit and Uber are immediate examples of how work can be reclassified to be about harnessing available resources to solve a particular task, rather than relying on an organised group of people identified as "plumbers" or "taxi drivers" in their job description. Even the work of the CFE Secretariat—a loose team of diverse individuals working in disparate locations but staying constantly connected through phones and computers—would not have been possible without modern technology.

> The future of work is not some science fiction dystopia where machines take over man.

When thinking about the future of work more broadly in the economy, we should more readily acknowledge that work

will be less about people showing up to the same location, the same desk, every single day, for 20 years of their lives. Instead, the work of the future will look more like problem solving around a web of discrete tasks—some more complex than others—that will require a dynamic set of people who bring with them a diversity of skills that are required to solve that problem at hand. From an individual's perspective, it is said that one could go through some six-and-a-half different jobs or "large tasks", within the duration of his or her career.

How should organisations respond then? Successful organisations of the future will be the ones that allow people, internal and external, to organise themselves to solve tasks. But beyond nimbleness, organisational structures will also need to be resilient enough to be drawn and redrawn around such self-forming teams, without losing the fundamental ability to achieve the organisation's mission or retain its culture.

Successful organisations of the future will be the ones that allow people, internal and external, to organise themselves to solve tasks.

The Changing Context that Is Our Region

Alongside the disaggregation of organisations comes the disaggregation of demand. In a globalised world, instead of large corporates being the drivers of knowledge and needs, empowered consumers, whose voices are amplified by Internet platforms and social media, will have an increasingly larger role in articulating what their specific demands are, and tasking organisations to design customised solutions to meet them.

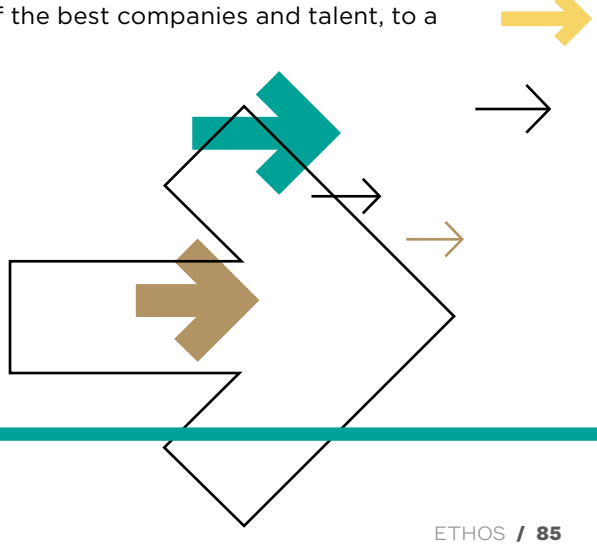
This power shift asks us to draw closer to the end-user to more deeply understand their needs. People often draw the wrong conclusion that just because globalisation and the Internet allow us to serve our customers from a distance, that it should be the main basis for interaction. Far from it: more than ever, a direct and detailed understanding of the markets and the people that we serve, will be the hallmark of a successful value proposition.

Worryingly, we often heard during CFE consultations that Singaporeans have resisted working overseas, particularly in the Asian region, because of its associated discomforts relative to home. Without direct international experience, Singaporeans naturally lost out when competing for the top positions in their organisations. This is particularly true if the end-markets are in ASEAN, which does not operate as a single unified market, and whose 600 million people express more cultural diversity and nuance than can ever be appreciated from afar.

If Singaporeans are serious about staying globally competitive, they will have to venture abroad to heighten their sense of other cultures and other structures. Governments and corporations can play a role in systematically increasing their people's overseas exposure early on, particularly to the biggest and emerging markets in the region. At the same time, it is also about accommodating—in our aspirations towards becoming a global city—a greater variety of cultural differences within Singapore, as more people with different backgrounds and experiences choose to study and work with us.

> If Singaporeans are serious about staying globally competitive, they will have to heighten their sense of other cultures and other structures.

More broadly, policymakers should think beyond Singapore as an agglomeration of the best companies and talent, to a



notion of Singapore as a hub that is the most connected outwards, with the best sense-making abilities in the rapidly evolving region that is Southeast Asia. Our key enduring advantage will be about being the most credible interlocutor in this region, and our institutional experiences and expertise must grow to reflect this accordingly.

The Changing Models of Learning

If the nature of work evolves to become more task-based and needs-focused, then education and training programmes will similarly need to be about increasing the workforce's range of skills and competencies to access and meet the needs of the future. A dynamic and globalised world means that learning is no longer about attaining educational qualifications by the early twenties, but about adding on new skills all the time, and just in time.

In thinking about the changing models of learning, we can think across two dimensions: *time* and *types* of recognisable qualifications. The *time* dimension is about dismissing the notion that education and training only happen in the first 20 to 25 years of one's life. Instead, they must happen throughout a person's career lifespan, perhaps in 5- to 10-year cycles, in tandem with innovation cycles and the average time it takes to build up expertise, all the way to retirement. In a sense, training is both a marathon and a sprint.

In terms of *types*, the economy must increasingly be able to attach a value to the acquisition of skills that are relevant in the workplace, but which may not be captured in paper qualifications. The creative industry, which privileges the quality of the portfolio over the individual's academic attainment, is perhaps a good example of this. The Singapore Public Service has also made positive steps in this direction, in allowing diploma-holders to access civil service schemes that hitherto were only accessible to degree-holders, if they prove through their work performance that they have the potential and ability to fulfil the job's requirements.

> Technology will remain very much a tool to enable the design and production of better goods and services that will benefit people: a supplement to, rather than a supplanting of.

If learning happens across a longer period of time, and mastery can take many forms, we must then grow accustomed to the reality that people will have, or aspire to have, multiple careers throughout their lives. Anecdotally, there already seems to be greater acceptance

of young people switching out of their desk-bound jobs to hone more technical or operational skillsets that will bring value to the economy in a different way: lawyers becoming restauranteurs, or teachers becoming freelancing coders, for instance. Singapore still has some distance to go in honouring vocational and technical craftsmen, the way some other societies such as Germany do.

The family may fret about unstable incomes, while the policymaker worries about the potential skills mismatch between the workforce and the economy, or how our social safety nets would hold up if the general trends continue. While these are all valid concerns, our primary focus should be on designing robust systems that support and recognise the lifelong learning of micro skills that are needed within the economy. And because of the close nexus of skills acquisition to the changing needs of the industry, companies must be an integral part of this intervention, in defining what "good" looks like, and in coming alongside to design and provide appropriate and timely training, for such systems to be effective.

It must be emphasised, however, that value can be objective and quantifiable. In supporting skills acquisition, it should not be anything goes, nor training solely for training's sake: I am reminded of anecdotes that the most popular training course that Singaporeans sign up for with their SkillsFuture credits, is *baking*.

> Training must happen throughout a person's career, in tandem with innovation cycles and the average time it takes to build up expertise. Training is both a marathon and a sprint.

Conclusion

Like it or not, the future economy belongs to those who are mobile and adaptable, who exhibit empathy and cultural sensitivity, and who can learn throughout their lives. To the extent that we can intentionally create a system to support these shifts, we should. But we must also be mindful that not everyone will be able to acquire and demonstrate these attributes to the fullest extent, and our system design must cater to them also, not leave them behind.

We must also be careful to not get so caught up with change that we forget what is evergreen. In the end, regardless of changing contexts, work is ultimately about creating meaning for ourselves and others. Meaningfulness does not always have to be about having the skills to teach robots to dance, or writing out grand strategies for the future.

More often than not, it's simply about looking around you, reaching out, and saying, "Here, you look like you need this." A future of work devoid of moments like these, is but work without a future. ■