

ARTICLE

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

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

---





[Daniel Lim Yew Mao](#)  
[Chan Chi Ling](#)

## DATE POSTED

13 Jan 2018

## ISSUE

Issue 18, 30 Jan 2018

## TOPICS

[Productivity](#)

[Innovation](#)

[Governance](#)

[Enforcement](#)

[Digitalisation](#)

[Data Analytics](#)

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*.<sup>1</sup>

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?

# 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.<sup>2</sup> 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.<sup>3</sup> 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.<sup>4</sup>

Meanwhile, *policy clockspeed*—the duration of a policy cycle and policy response time—has not kept pace in some domains.<sup>5</sup> 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 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.<sup>6</sup> 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.<sup>7</sup> 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?<sup>8</sup>

## 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.<sup>9</sup> More recently, MAS has also adopted a “wait-and-see” approach to regulating cryptocurrency.<sup>10</sup>

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.<sup>11</sup>

## **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.

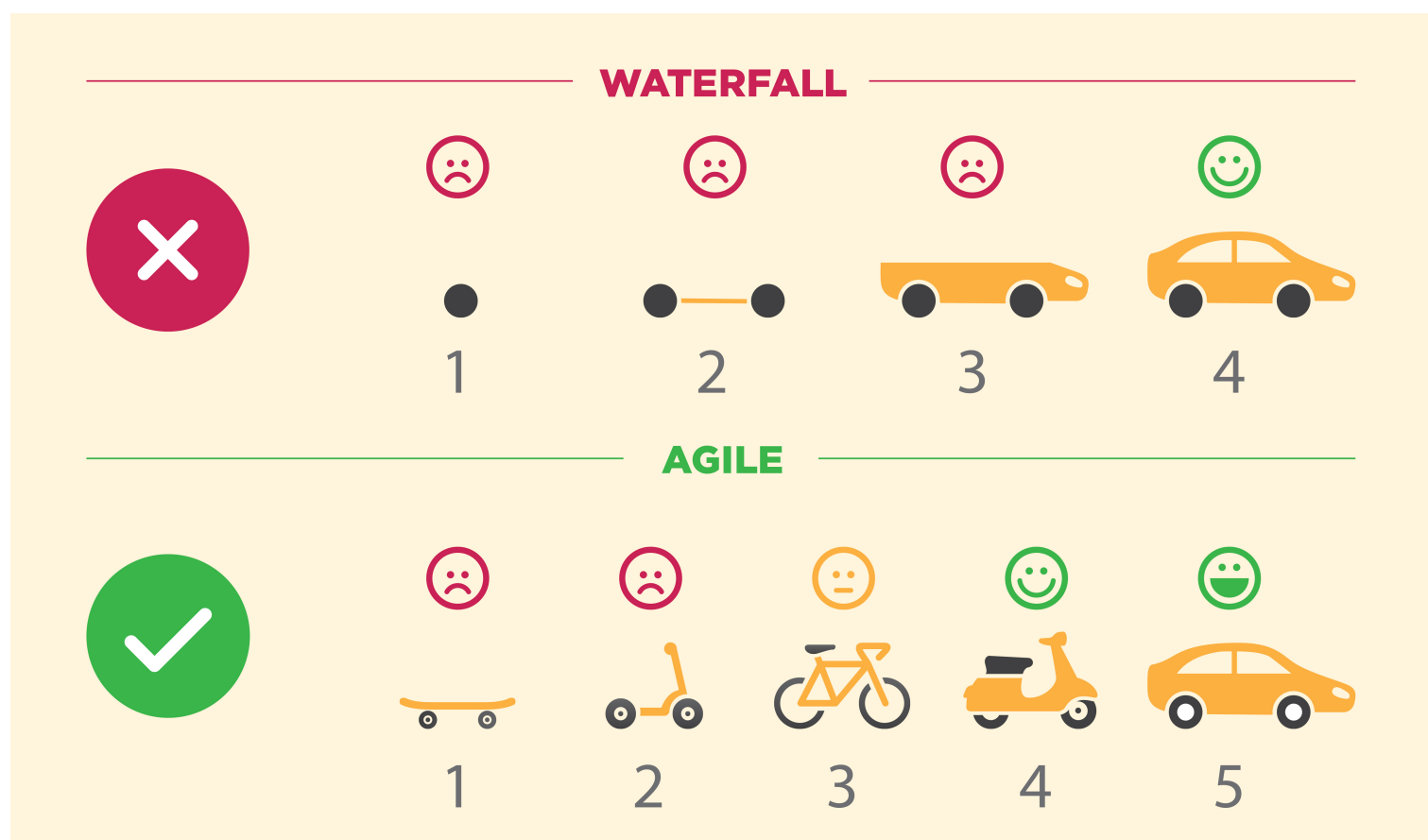
However, the governance of AI is unlikely to be straightforward. Developing algorithms in a sandbox environment is different from operational deployment, where more complex policy and operational issues arise. For example, who bears liability if the AI makes a wrong recommendation? How will an AI recommendation 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).



**Figure 1.** "Waterfall" versus "Agile" Approach to Product Development<sup>12</sup>

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

1. **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.
2. **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.

3. **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.<sup>13</sup>

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.

### 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.

[READ MORE](#) →

### 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.

[READ MORE](#) →

### Towards an Agile Public Service—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.

---

[READ MORE](#) →

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

## ABOUT THE AUTHORS

**Chan Chi Ling** is Strategist at Strategic Planning & Futures, Strategy Group, PMO. She is currently on secondment to the Agency for Integrated Care, Ministry of Health Holdings. She holds a BA in Political Science, and an MS in Symbolic Systems from Stanford University.

**Daniel Lim Yew Mao** is Acting Deputy Director at GovTech's Data Science & Artificial Intelligence Division, where he leads the Quantitative Strategy team. He received a PhD in Government and an MA in Statistics from Harvard University, where he was also a member of Harvard's Behavioural Insights Group.

## 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->

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.

[Back to Ethos homepage](#)





## More in this issue

OPINION

**Public Service 4.0: What Might It Look Like?**

OPINION

**Making Technology Work for Workers**

---

OPINION

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

OPINION

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

# Civil Service College

## LEARNING

Programmes

Learning at CSC

Help

## ABOUT CSC

Who We Are

Join Us

Rent A Facility

## NEWSLETTER

Get the latest programmes and knowledge on topics of your choice.

## SUBSCRIBE

[Contact Us](#)

[Feedback](#)

[Share Your Views @ REACH](#)



[Report Vulnerability](#)

[Privacy Policy](#)

[Terms of Use](#)

[Rate This Site](#)

Last Updated 7 May 2018

Copyright © 2018 Civil Service College. All rights reserved.

This site is best viewed using IE9.039 & above and Chrome.