

# FORESIGHT



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# FOREWORD

COVID-19 has stricken the world since January 2020. Questions have been asked as to why the world had not seen this coming and learnt the lessons from combating SARS, MERS, Ebola and other outbreaks. American epidemiologist Dr Larry Brilliant, who helped eradicate smallpox, famously said, “Outbreaks are inevitable. Pandemics are optional.” In other words, new diseases will break out from time to time, but we can be prepared for and prevent them from becoming pandemics.

Singapore had learnt some lessons from our SARS experience, including investing in our National Centre for Infectious Diseases. These had helped us in our COVID-19 fight. But each disease is different. We have to stay agile and nimble and respond to the fast-changing challenges. Concurrently, even in a crisis as deep and protracted as the COVID-19 pandemic, we in the Public Service must continue to devote time and capacity to keep the long view and focus on the future. For one, we should be thinking about and planning for the future post-pandemic, including how we can rebuild and recover to be stronger. We should also be thinking about how to prepare for a future Disease X, to prevent it from becoming an epidemic or pandemic.

These will require foresight and futures thinking, work that is spearheaded by the Centre for Strategic Futures. Foresight helps us to see what the possible states of future are. Futures thinking helps us to understand how these states might unfold, and consequently how we ought to challenge our biases, blind spots and mind-sets. We then need to systematically translate these insights into strategies and policies, to take the necessary steps now to be prepared for the future. Thus, even as we continue to fight this COVID-19 battle, our work in applying foresight and futures thinking remains important.

Moreover, even as diseases may be top of mind now, there are many other big shifts—climate change, technological advancement, demographic changes—all of which will reshape the world too. This edition of *Foresight* also addresses these other big shifts. We will similarly need to prepare ourselves for them, and continue our work on foresight and futures thinking accordingly.

**LEO YIP**  
Head, Civil Service

# 2019– 2020 HIGHLIGHTS

By Jeanette Kwek

Since its inception in 2009, the Centre for Strategic Futures (CSF) has stayed true to its mission: positioning the Singapore government to successfully navigate emerging strategic challenges and harness potential opportunities in an evolving world. Foresight work helps us to look ahead, to anticipate change, and adapt as challenges unfold. It supports better decision-making today, by balancing the insistent pull of the present against the most distant needs of the future. In order to achieve these objectives, the Centre focuses on developing and communicating insights about the future to a range of policy audiences, as well as on developing foresight capability within the Singapore Public Service.

CSF has continued to focus its research agenda on several themes from the National Scenarios 2035 exercise, which concluded in 2016, as well as emerging areas of interest. The COVID-19 pandemic, appearing suddenly on the horizon in early 2020, also resulted in a reprioritisation of the Centre’s work as we grappled with potential discontinuities arising from this protracted crisis.

## DEVELOPING AND COMMUNICATING INSIGHTS

In keeping with its focus on the intersection of technology and society, CSF held the fifth edition of its biennial conference, **Foresight Conference 2019 (FC 2019)**, to discuss the question of what society in the Fourth Industrial Revolution (or “Society 4.0”) might be like. We examined this future society through the lenses of the individual, of relationships, of time, and of values. As always, we are indebted to our Distinguished Fellows **Richard O’Neill**, founder and President of the Highlands Group, and **Peter Schwartz**, Senior Vice President of Strategic Planning at Salesforce, for their assistance in shaping the conversation and assembling our eclectic, multidisciplinary group of participants.

They included:

- **Geoff Mulgan**, Chief Executive, National Endowment for Science, Technology and the Arts (NESTA);
- **Ken Liu**, Hugo- and Nebula-winning author of speculative fiction, programmer, lawyer, technologist;
- **Huw Price**, Bertrand Russell Professor of Philosophy and Fellow of Trinity College, University of Cambridge;
- **Cecile Wendling**, Group Head, Foresight, AXA and Researcher at the Centre de Sociologie des Organisations;
- **Eugene Wei**, angel investor and former Head of Video at Oculus VR;
- **Jaan Tallinn**, co-founder of Skype and Kazaa, as well as co-founder of the Centre for the Study of Existential Risk (CSER) at Cambridge University, and the Future of Life Institute at Massachusetts Institute of Technology (MIT);
- **Pamela Chng**, founder of social enterprise Bettr Barista Coffee Academy; and
- **Nick Yee**, author and co-founder of Quantic Foundry

As FC2019 coincided with the Centre’s 10<sup>th</sup> anniversary, we brought together Singapore foresight pioneers and generations of foresight practitioners in a mini-reunion to celebrate. We also reflected on how much our practice has changed with time and as our world grew increasingly complex. More about the discussion and insights we drew from two intense days of discussion can be found at pages 85 – 95.

2019 also saw a shift in focus away from an evolving US-China bilateral relationship toward the implications of climate for a changing global order. Our work on a **warming world** recognised that the world stands at a climate inflection point, and that the solutions before us may fail due to collective inaction, and barriers to effective implementation. What alternatives might we have to avert disaster? Find out on pages 82 - 84.

In addition to these major themes, our work on identifying **Emerging Strategic Issues (ESI)** by picking up weak signals of change on the horizon continued apace in 2019-2020. Our ongoing ESI process has generated system-wide conversations on a wide variety of topics, including green burial, the new digital vulnerables, and the rise of co-living. A sample of the ESIs and research deep dives we have worked on, some of which are presented as “Artefacts from the Future”, can be found at pages 08 – 32.

2020 also saw the Centre kicking off the seventh edition of the **National Scenarios**, which focuses on identifying major trends that will shape our world over the next two decades, and how they might affect Singapore’s future. In pages 106 – 117, we explore major themes in the **National Scenarios 2040**, such as the changing nature of power and influence, the impact of interdependence and interconnectedness, a blurring of boundaries between the physical and the virtual, and a renegotiation of values and belief systems.

### THE IMPACT OF COVID-19

The COVID-19 pandemic in early 2020 disrupted our carefully-laid plans for the year, but also provided impetus for us to transform how we work as a result.

Planned research was placed on hold as the team pivoted to supporting our colleagues,

pressed for time and coping with immediate implementation challenges at every twist of the virus’ evolution, in thinking about what comes next—or indeed, what “the new normal” in a post-COVID world might look like.

(Spoiler alert: the world might never be post-COVID.) Our work ranged from identifying broad potential shifts and discontinuities early on to focusing on narrow and specific potential impacts as the shape of the crisis became clearer. Our thoughts on the lessons we learned about foresight in a pandemic, as well as the issues we thought were most pertinent in an emerging new world, can be found in our special **COVID-19 insert**.

COVID-driven digitalisation has also had a lasting effect on CSF’s networking efforts. Reaching out to international thought leaders as well as our counterparts has always been a large part of the Centre’s portfolio. While COVID-19 prevented travel in the last year, embracing digital tools allowed us to continue reaching out to the international foresight community. While it was challenging to make new acquaintances, virtual meeting spaces such as Zoom allowed us to deepen our relationships with existing international partners. We exchanged notes on our COVID-related work, and how the crisis was strengthening the nexus between foresight and policy-making.

### RISK AND IMAGINATION

The experience of COVID-19, its wide-ranging impact and the long tail of continued disruption we expect in this “new normal”, has provoked new consideration of risk, resilience, and adaptation. Our essay on **the language of memory and metaphor** as a means to explore and communicate their significance, and to develop shared ideas around how we might begin to address them in a complex world, can be found at pages 73 – 81.

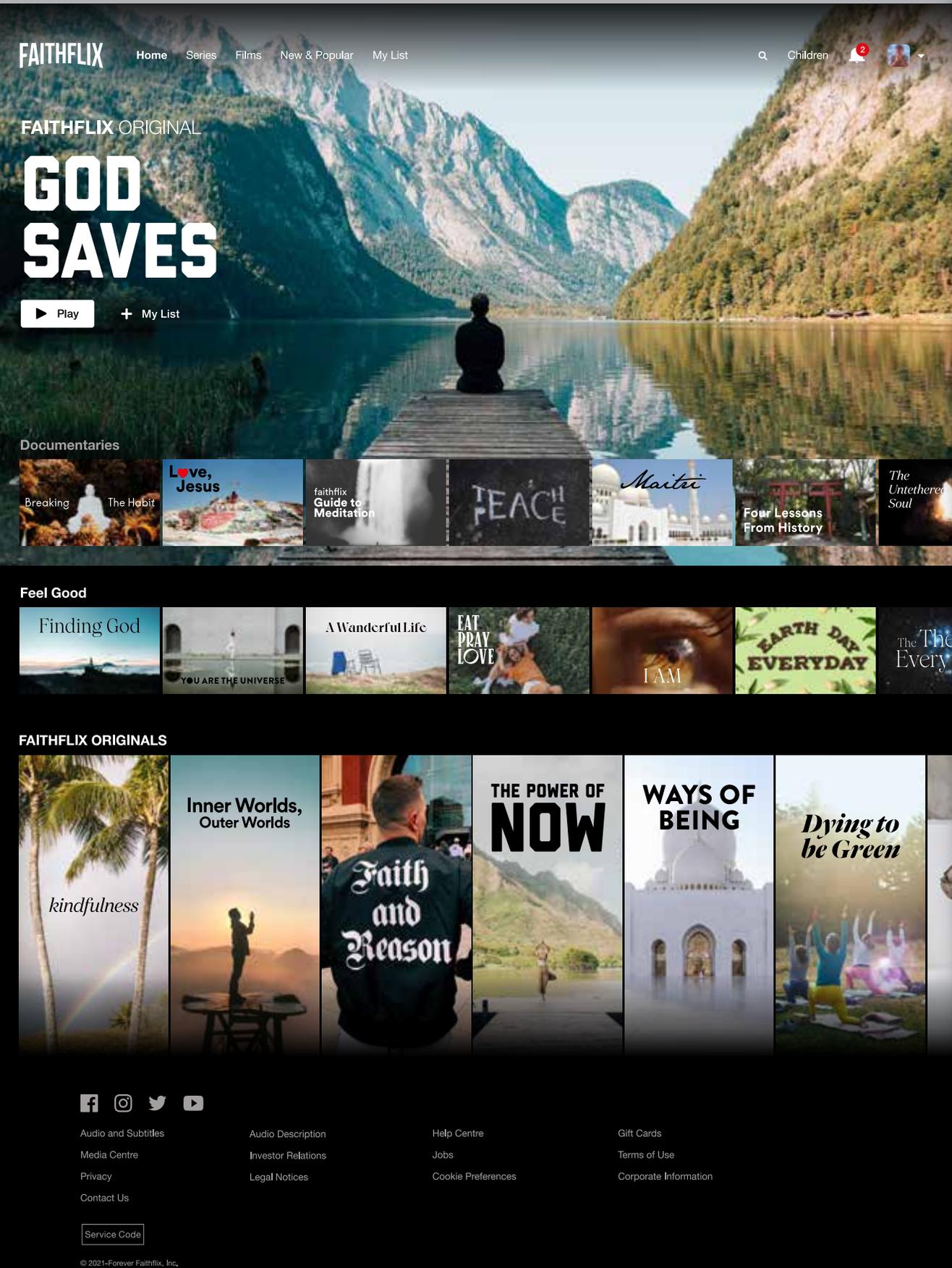
### CAPABILITY DEVELOPMENT

The foresight ecosystem within the government continues to grow in size and strength. CSF aids this growth in two key ways, by running a suite of FutureCraft courses at the Civil Service College, and by bringing the community together through platforms that we hold.

FutureCraft courses are intended to equip Public Service officers with futures methods as well as practical tips on how these methods might be used in their respective organisations. Participants have consistently indicated their appreciation for practitioner panels, which gave them insider tips and tricks on how to situate foresight alongside the work of policy formulation, and to gain traction within their organisations. Restrictions imposed by the COVID-19 pandemic briefly slowed these efforts in 2020. However, the team swiftly embraced digitalisation, and adapted our offerings for a virtual space. Embracing asynchronous learning and the flipped classroom, CSF’s capability development team has found new ways to ensure that time spent together face-to-face, whether in person or in virtual breakout rooms, was productively spent helping officers adapt and apply our tools to their work.

Our platforms, chief among them the Strategic Futures Network (SFN) and Sandbox, similarly went online. Since 2019, the Sandbox, a community of practice for foresight practitioners and allies within the Public Service, has taken a more themed approach to its agenda, tapping the insights of its members on topics ranging from the future of tourism to the future of quantum computing. As the Sandbox community has developed, so has the broad cross-pollination of ideas and practices across foresight teams in government.

The Centre continues to embrace its mission to “scout, challenge, and grow”: to build our sensitivity to change, and our ability to embrace and adapt to uncertain times ahead, for the year ahead, and many more to come.



# PROMISES AND PERILS: EMERGING FORMS OF COLLECTIVE INTELLIGENCE

By Tse Hao Guang

Whenever humans work in groups, we display collective intelligence (CI) to varying degrees. In this sense, CI has always been with us. Families, companies, countries and the economy are examples of humans working together in CI systems, utilising various tools at our disposal to address problems and accomplish feats that no single person could have alone. In recent years, the coupling of humans and digital networks has created collectives that can coordinate themselves better than ever, with real-world effects. The political mobilisation of millions on social media during the Arab Spring is just one example.

Even newer forms of CI are emerging. New technology enables CI systems to become much more decentralised than before, to incorporate new kinds of data at newly massive scales, and to connect both human and artificial agents in novel ways such as through gamification. This does not mean traditional CI systems like governments or corporations will disappear, although they will likely have to work with, manage and be themselves changed by new CI systems. Let us take a look at three forces driving the evolution of CI systems to catch a glimpse of what the future might hold.



### SCATTER

Emerging CI systems are becoming even more decentralised, with pre-existing nodes of knowledge and power being dispersed by radical peer-to-peer technologies and movements.

Examples of these include blockchain-enabled Decentralised Autonomous Organisations (DAOs) that can raise funds and be managed collectively through smart contracts, as well as the rise of additive manufacturing allowing networks of makers and factories equipped with 3D printers to perform some functions of traditional factories.<sup>1</sup> Such flatly-organised CI systems may increase agility and spur innovation on one hand, but cause immense disruption and pose regulatory challenges on the other.

The speed and resilience of maker networks was powerfully proved during the COVID-19 crisis. After being alerted through its networks, an Italian 3D-printing company brought a printer to a local hospital running low on ventilator valves, redesigning and printing them within hours even as the usual supply chains failed to meet emergency needs.<sup>2</sup> In similar vein, a Facebook group called Open Source Covid19 Medical Supplies was set up to facilitate the sharing of 3D printing files for ventilators, respirators and other related equipment.

On the other hand, traditionally hierarchical CI systems such as governments will find it challenging to understand (let alone communicate with or regulate) DAOs and other networks comprised of numerous collective decision-makers spread across multiple jurisdictions. As more DAOs materialise, they provide people with the opportunity to experience alternative forms of local governance, at a moment where skepticism of globalisation and traditional institutions is high.



### DISSOLVE

More real-world assets are gaining digital properties, becoming increasingly indexable, searchable and traceable, and behaving more like online commodities. Such assets may be physical things, high-touch services and skills, or even human bodies.

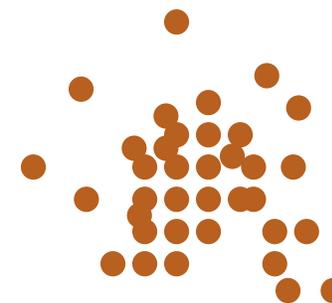
As working from home is normalised and telepresence robots proliferate, even services such as driving and babysitting can be performed and monitored remotely.<sup>3</sup> Digital marketplaces for many goods and low-touch services already exist, but now imagine a jobs portal offering the best remote waiters for your telepresence robot café from anywhere in the world, including people who are wheelchair- or bed-bound.<sup>4</sup>

Such remote work technologies promise to enable more groups to enter CI systems such as labour markets. In particular, those with physical disabilities, some blue-collar workers or lower-skilled service providers, and those living outside of major world cities may be able to overcome geographical and physical limitations and find new opportunities.

The digitalisation of the body is another important aspect of this driving force, with biometric sources of data rapidly expanding beyond the fingerprint, iris, voice and facial domains to “micro-gestures”, gait and even “body internal” devices such as digital pills swallowed to track health.<sup>5</sup> Biometric data is much more personal and, in many cases, harder to anonymise or disassociate from individuals than other kinds of data.

Therefore, the ethical challenges of collecting and using data will continue to be significant, even as the potential benefits of feeding more and new data to CI systems increase and

tantalise decision-makers. Global differences in ethical standards may make technological progress uneven, potentially culminating in a regulatory race to the bottom where the least ethical reap the most rewards.



### CLUMP

Abundance changes the way communities and CI systems are formed, leading to new concentrations of knowledge and power. Such groups will run on formerly fringe principles or mechanisms such as gift culture, AI coordination and gamification.

Most groups today are organised around command or exchange relationships, where power is relatively centralised and status is determined by control over scarce resources. In emerging spaces where power is decentralised, and resources such as data are relatively abundant, gift cultures form alongside command and exchange ones. Within such cultures, power and status is determined instead by what you give away.<sup>6</sup>

Traditionally, gift cultures have been observed among people living in mild climates with abundant food. Today, the subcultures of hackers, hardcore gamers and Silicon Valley tech entrepreneurs exhibit aspects of gift culture.<sup>7</sup> With social media and casual gaming, an abundance of information and sharing platforms is familiarising masses of ordinary people with, and inducting them into, gift culture dynamics.

These masses are growing exponentially. Artificial agents such as AI are being used to connect and mobilise the abundance of human agents. Working together, humans and AI can do better than either alone, whether it be diagnosing illnesses, or predicting the future.<sup>8</sup> Putting

a machine in the group seems to improve the wisdom of the crowd.

Where there is an abundance of digital communities and platforms, some CI systems recruit users by gamifying coordination. A mobile game utilising 3D navigation, Sea Hero Quest, produced over a century’s worth of data on the impact of dementia on spatial awareness in months with millions of players.<sup>9</sup> However, gamified CI systems may not always be so benign. Conspiracy group QAnon, for example, hooks its members using methods similar to those employed by Alternate Reality Games.<sup>10</sup>

CSF developed three scenarios which imaginatively explore CI at different scales, envisioning intersections of and interactions between the driving forces. The scenarios seek to inspire broader debate around how we can best design and deploy CI to tackle wicked or emergent problems.



## THE MOOD MERCHANT

**How will a future individual navigate new CI systems? How would their life, and perhaps even conception of human nature, be different?**

Krystal Sim is a biohacker, adept at refining and monetising biometric data.

She uses a non-invasive brain-computer interface that digitally encodes, saves and broadcasts emotions called Massive Open Online Desires.<sup>11</sup> Some of her custom moods have been minted as NFTs and are in great demand.

She's been approached by digital platforms looking to license her moods, playing them automatically to users entering areas of their virtual worlds. Worried they will incorporate her moods into AI datasets, she has always refused.

Unsurprisingly, her best moods are getting pirated. She's partnering anonymous pro-copyright activists to protest virtually, broadcasting high-quality anger to attendees.<sup>12</sup> If successful, they plan to march in-person, broadcasting her anger on the streets to raise awareness of mood copyright.

# 01



## THE LIQUID FIRM

**What would a CI company look like? How would it be organised, and what value would it create?**

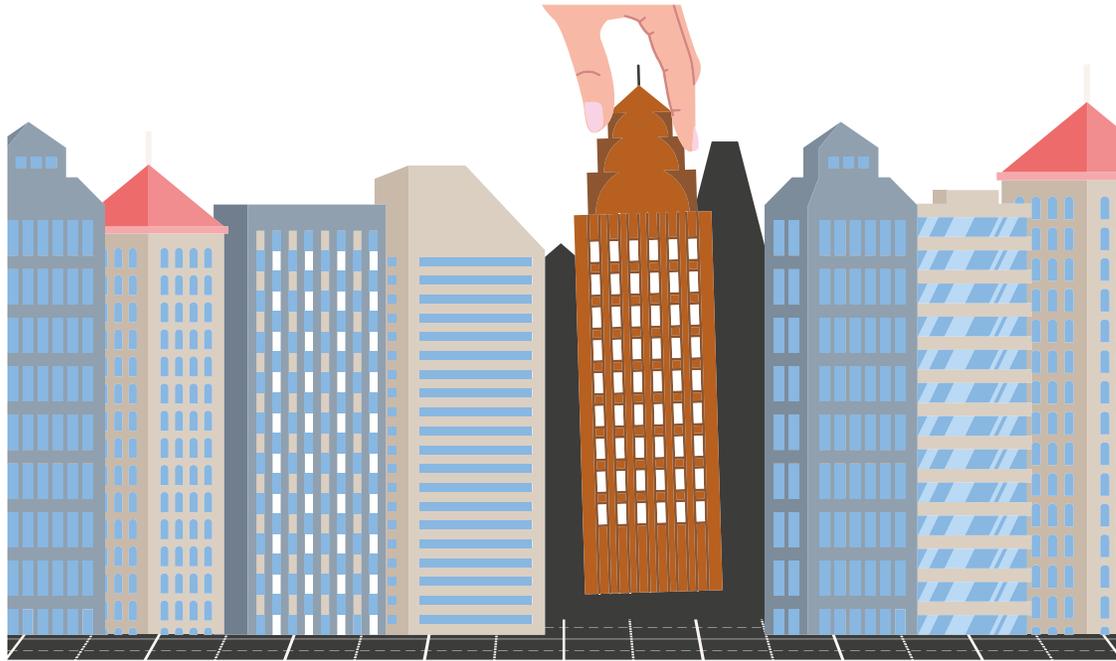
Everyone games on the blockchain. Open source, free to play, unhackable, and boasting 24/7 uptime without centralised servers, these games let players create and own assets, enabling in-game free markets, natural price discovery and greater integration of real-world and game economies.<sup>13</sup>

In Astrolingo, pseudonymous players explore alien worlds, levelling up by learning endangered languages via game mechanics and interacting with other players. Voice filters let players speak without revealing their identities, and digitised oral archives allow for some automatic language verification.<sup>14</sup>

Wormhole is a tutoring firm running in Astrolingo. It matches tutors to students who give them assets in exchange for one-on-one coaching. Tutors can also use their teaching experience to improve the game's mechanics.

It is suspected that several Astrolingo players (and thus Wormhole tutors or students) might be experimental AIs, but the Astro-community is unconcerned.

# 02



## THE USER GENERATED CITY

**What if a future smart city were not simply tech enhanced, but meaningfully integrated with its residents into a CI system?**

New Xanadu is a city that fuses radical grassroots action with top-down governance. Instructed by the central government to create a user-generated city, NX's planners were given an existing large town as an urban sandbox.<sup>15</sup>

Residents suggest and vote on ideas such as expanding pleasure gardens, increasing physical or digital accessibility and creating intergenerational housing. AI overlays surveillance data and cost-benefit analysis before strong ideas are implemented. Social credits are given to participative residents and deducted from unresponsive ones.<sup>16</sup>

Rapid prototyping and industrial-scale additive manufacturing enables quick implementation of all ideas, often weeks from voting. Residents continue to suggest improvements to these "minimum viable products" over time.

Today, NX has entirely user-generated districts. Its best ideas are ported into other cities. Here, people say "only the state can successfully decentralise!"<sup>17</sup>

# 03

## IMPLICATIONS

As shown, the future of CI has far-ranging implications. While nascent CI systems can be studied, they might exhibit emergent properties at scale and over time, the effects of which would be difficult to fully imagine.

Mass recruitment into new CI systems may strengthen collectivist tendencies within society, renew a genuine desire for participative governance and reduce the administrative friction of direct democracy. On the other hand, if many people are involved in multiple, rapidly evolving CI systems, the effect could be disorientation, a more fragmentary sense of self, and even a retreat into gamified fantasy worlds.

At the level of institutions, the most forward-thinking governments and companies may themselves incorporate new CI methods, both to capitalise on opportunities and guard against threats that new CI systems pose. For example, instead of relying on centralised fact-checking to combat fake news, a decentralised, collectively intelligent network comprised of citizens, experts and others might be able to more quickly, effectively and organically restore trust in the media landscape.<sup>18</sup>

While the precise contours of the future are almost by definition uncertain, any future is built together, not alone. Perhaps, then, the project of the future requires our collective intelligence, with its own promises and perils to watch out for.



DIGITALLY ✕

VULNERABLE ✕

DIGITAL ✕

NATIVES ✕

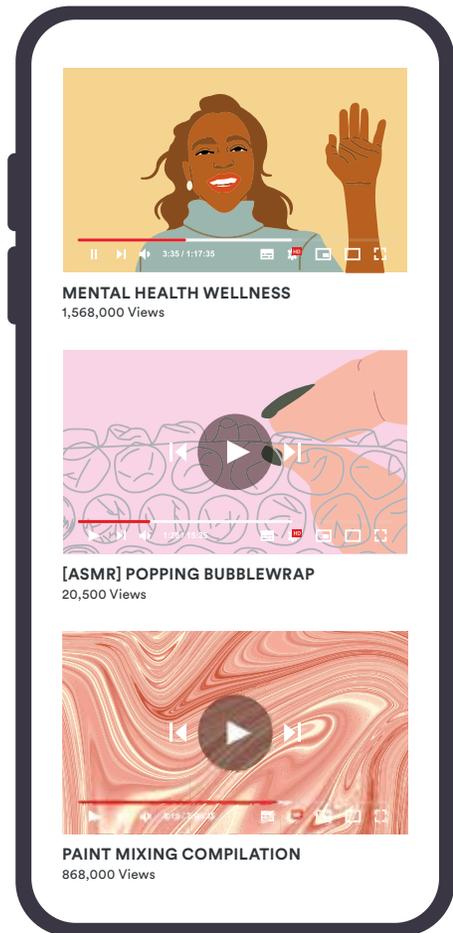
By Kenneth Poon

COVID-19 led to significant disruptions globally and more people were forced to work from home and connect virtually rather than physically. Perhaps, what we experienced might really just be an acceleration towards a “new normal”, in which most parts of our lives are spent online and we only have limited physical connections with other people—might this be the new default for social experiences? We need to look no further than youth today to observe signals of this emerging strategic issue.

Digital natives has long been a term used to describe people born during the age of digital technology and are familiar with computers, the internet and mobile devices from a very young age. Our youth are increasingly described as such natives. How well do we understand the psychological and emotional state of digital natives, constantly navigating the “always on” culture of hyper-connectivity? CSF investigated Digitally Vulnerable Digital Natives as part of ongoing research into the impact of technology on society.

Digital natives mostly comprise the Millennial (born between the early-1980s and mid-1990s) and Generation-Z (born in the mid-1990s onward) cohorts. Digital natives are highly conscious of their online image and face social pressures and unrealistic aspirations created by hyper-connectivity.<sup>1</sup> It is no wonder then that there seems to be increasing psychological health issues and rising suicide rates among youth across socio-economic classes, with cyberbullying and the need for social validation among the triggers.

Perhaps, an entryway into understanding the psyche and emotional health of digital natives would be to scrutinise how they seek release. Some emergent stress relief and self-therapy techniques have become widely popular on social media. Digital natives have taken to them as alternatives to traditional forms of therapy.



### MENTAL HEALTH VLOGS

Influencers—with no medical expertise—publicly share videos on platforms like YouTube in which they discuss personal struggles with mental illnesses and emotional stress. Some of these videos generate lengthy discussion among viewers and between viewers and the vloggers.

### AUTONOMOUS SENSORY MERIDIAN RESPONSE (ASMR)

ASMR is an auditory stimulus that causes a tingling sensation down the neck. ASMR is massively popular on YouTube. The music platform Spotify even has multiple ASMR playlists tailored for sleep and meditation.

### ODDLY SATISFYING VIDEOS

These videos feature objects handled in particular ways, like the mixing of paint or the cleaning of objects, that have led viewers to say that they feel “brain massaged”, lightly hypnotised, and calm.

On Reddit, a social media platform popular among digital natives not only globally but also in Singapore, the number of subscribers has sharply increased in the last four years for channels that discuss these three genres. On these channels, Redditors are actively sharing and discussing newly discovered material and techniques that work for them.

But how do they work? Experts explain that mental health vlogs normalise and validate the severe mental illnesses experienced by viewers, making them feel safe.<sup>2</sup> This experience of a safe space might explain the popularity of these tools. People can access tools like ASMR individually and from the comfort of home, without having to be vulnerable to another person.<sup>3</sup> Experts have also explained that Oddly Satisfying videos curb anxiety by taking up space in one’s working memory, leaving less room for thinking and worrying about other things.<sup>4</sup>

Nevertheless, the accessibility and popularity of online communities forming around these genres have led to concerns about worrying effects. ASMR users have said that they experience increasing intolerance to the calming effects of ASMR clips and have a constant need to find new videos with different triggers. This could indicate addiction. Digital natives may also take these tools as alternatives to formal clinical treatment.

*In a plausible future* of pervasive connectivity enabled by 5G hyper-speeds and further enhanced by virtual reality (VR), masses may turn to digital means of stress relief. Online communities will continue to grow around discussions on stress relief techniques. Anxiety and stress management through such tools may become normalised.

Mainstream businesses may capitalise on this trend and start offering digital therapy and spa sessions, much like how Millennials had turned to arcades and LAN-gaming centres to de-stress. Such businesses already exist. Whisperlodge is an ASMR spa set up by Melinda Lauw, a young enterprising Singaporean based in New York. Her company offers personalised live ASMR therapy sessions in which she would create different sounds to trigger relaxation for clients.

Might digital natives with serious mental conditions avoid professional help in the future not because of any stigmas, but because alternative but ineffective digital therapies become popularised? At best, vulnerable individuals could be reliant on digital immersion and withdraw from the real world, but more severe cases may have disastrous outcomes. Earlier this year, a teenage girl in Malaysia killed herself after an Instagram poll she put up concluded with 69 per cent of her followers voting in support of her killing herself.<sup>5</sup>

More extreme cases of anxiety and struggles, coupled with poor community support, may lead to tragic results like self-harm and suicide. There are mental health vlogs that discuss struggles with impulse-control disorders like “dermatillomania”, a condition that causes people to pick their skin repeatedly, often resulting in wounds. Such videos require viewer discretion as some images may be a severe trigger for anyone sensitive to topics like self-harm.<sup>6</sup>

As these tools evolve and become more sophisticated, it becomes more uncertain how exactly digital natives will become more vulnerable. However, there are signals of growing complexity in the types of tools available. Take the emergence of ASMR Partners

as an example. Owen Riley is a 17-year-old boy who has never had a girlfriend, but has become a popular ASMR artist who role-plays as a boyfriend. His YouTube channel has at least half a million subscribers.

## When digital therapies takes off, where do we draw the line?

We have seen reports of shut-ins, otherwise known as *hikikomori*, emerging all around the world. How will these tools deepen an already existing problem, and push already vulnerable youth even further away from help? As more of us spend time online for work and play during the COVID-19 pandemic, might such vulnerabilities expand to the non-digital natives, such as Boomers?

Research is too nascent to explain the long-term effects and vulnerabilities of these new digital techniques. Users may become a new vulnerable group with a higher exposure risk to online manipulation. There is already growing controversy about how period-tracking apps are monetising women's personal data by selling these data to social media platforms like Facebook for targeted advertisements.

Research that is cohort or age group specific is also lacking. Current research only focuses on digital natives, but we do not know how other groups of people who did not grow up in the cyber world are interacting with digital stress relief tools. Might we need to further study the range of tools and their users? Perhaps the popularity of self-therapy tools may be a helpful marker to understand psychological and emotional well-being of people.

At CSF's biennial Foresight Conference in 2019, participants noted that digital natives have a strong preference for ambient intimacy—a shallow but pervasive form of intimacy driven by social media and other relatively frictionless forms of communication—over face-to-face interactions and deep interpersonal connections. This raises questions as to how these tools may affect the importance of traditional support systems like the family. We will perhaps also need new forms of psychiatric interventions to care for and serve the needs of digital natives.

Regardless, the rising popularity of digital stress relief tools is surely an early signal of how the digital natives of Society 4.0 will approach stress and relaxation.



# BREAKING THE HABITAT: THE RISE OF CO-LIVING

By Maverick Teo



The rise of co-living will shift our notions of home ownership and the way we live.

## THE CO-LIVING LANDSCAPE IN SINGAPORE

Within the last few years, **co-living has expanded dramatically in Singapore**. Today, there are more than 25 co-living companies in Singapore, up from just three in 2018. Gaining traction as an attractive alternative to traditional residential leasing, co-living is an all-inclusive communal living arrangement in which tenants enter into individual lease agreements in exchange for private bedrooms, shared community spaces and building amenities. Tenants do not have to deal with fussy landlords, long leases, and security deposits. Leases typically start from three months, rooms come fully furnished with stylishly designed interiors, and rental rates include all utilities as well as cleaning.

Demand for co-living spaces in Singapore mainly comes from postgraduate students, young professionals, and young Singaporeans who have lived overseas and are finding it a challenge to live with their parents. There are also singles or newly-married couples awaiting their HDB flat who opt for co-living instead of living with their parents.

Despite taking a hit during the early stages of the COVID-19 pandemic, demand for co-living spaces has held steady. Cove, Hmlet, and lyf still managed to retain high occupancy rates of more than 90 per cent in 2020, while Figment saw its occupancy rate drop to around 70 to 80 per cent.<sup>1</sup> These companies have reported more enquiries from people wanting to move out of their homes since April 2020, when Singapore's Circuit Breaker took effect. They have also reported a four-fold increase in local demand as Singaporeans work from home or return from overseas.<sup>2</sup> The latest shift in interest brought about by COVID-19 is driven by feelings of being “stuck at home” coupled with extended periods of working from home.

Ultimately, the trajectory of the co-living industry is likely to be **strongly affected by whether the global public health crisis improves or worsens**. In an era of social distancing, the touted virtues of co-living may prove to be its downfall. Nevertheless, prolonged periods of isolation heighten the desire to connect with others. If co-living operators can pivot to adapt to the “new normal” with social activities organised in smaller groups with restrictions in place, co-living may become more attractive in this pandemic, driven by this increased desire to connect and to have a more conducive work-from-home environment.

## CHANGING EXPECTATIONS OF HOUSING

Co-living may become a more attractive option as expectations of housing change. As birth rates in Singapore and other developed countries decline, there might be a reduced emphasis on child-suitable housing and homeownership. This could result in fewer youth thinking of housing as a long-term asset. As working from home becomes the norm, **fewer may think of housing as a place away from work.**

New expectations may replace these traditional expectations. One notable expectation is of **housing as a space to connect with a like-minded community.** This is partly an answer to modern youth isolation—according to the 2018 BBC Loneliness Experiment which surveyed more than 55,000 people, 40 per cent of 16 to 24-year-olds reported feeling lonely often or very often. Youth loneliness is often more about difficulties connecting with others than being alone. Regular and structured social activities offered by co-living spaces coupled with physical proximity may serve as promising solutions.

Operators of co-living spaces are sensing this need for connection, and are designing spaces and programmes to meet this need. Most co-living spaces offer communal spaces such as dining rooms, lounge areas, and roof gardens to provide opportunities for residents to make new friends. Many organise regular events such as board games sessions and movie nights. Members are also free to organise their own yoga, drawing, or cooking programmes. Cove has even developed its own flatmate compatibility system to help residents connect with one another, facilitating a sense of community.

Beyond just a roof over one's head, more people may also view **co-living as a lifestyle choice.** For the rising number of single Singaporeans with high spending power, pragmatic considerations such as proximity to schools and childcare centres are being replaced by the allure of vibrant and aesthetically pleasing communal living facilities. Operators have responded—some companies offer co-living spaces in prime locations such as Marina Bay, Orchard, and Tanjong Pagar. Renting a room situated in these vibrant neighbourhoods will be an excellent choice for those who want convenient access to the Central Business District (CBD) and a plethora of amenities. Figment offers a more luxurious take on co-living. Tenants can experience uniquely Singaporean boutique living in heritage shophouses within historic districts. Community events take the form of cultural activities such as private dinners with local chefs and cocktail mixing sessions with top bartenders. In addition, co-living companies market their living spaces as dynamic environments focusing on self-growth and empowerment, appealing to young working professionals.

While the majority of co-living operators have focused on the “young and hip” demographic, there is room to apply this typology to seniors as well. Seniors face social isolation and loneliness just as youths do, aggravated by potential long-term restrictions on social

interactions in the COVID-19 era. The number of childless seniors with spending power looks set to rise. These seniors may seek housing options that offer a sense of community. As developed countries turn increasingly grey, such seniors will form a sizeable market for co-living arrangements in the near future.

## What does the rise of co-living mean for the future of the home and neighbourhood?

### THE FUTURE OF CO-LIVING IN SINGAPORE

Given the complexity and volatility of the modern world, it is hard to predict the future of co-living in Singapore. Three critical uncertainties affect how co-living may play out:

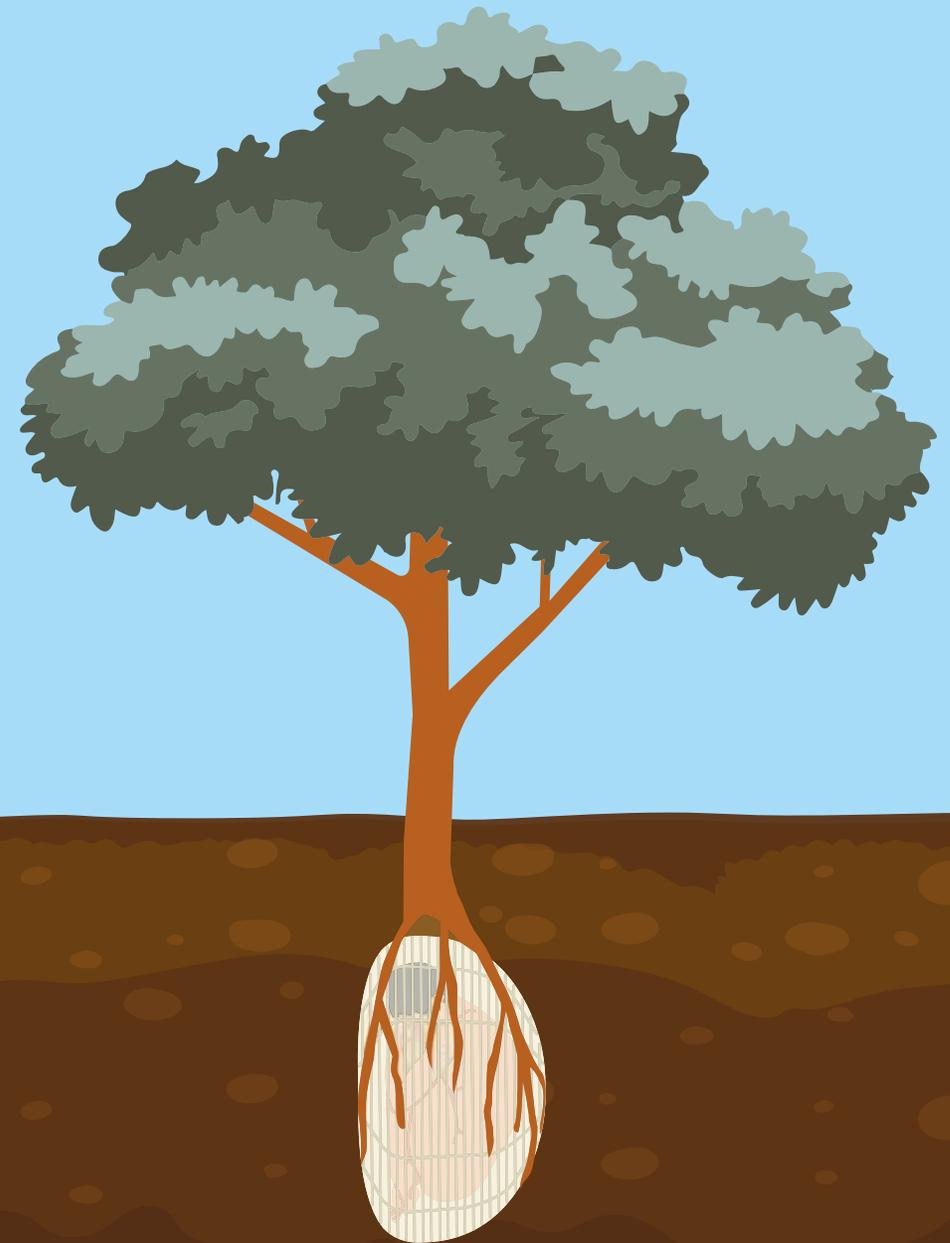
1. Will the younger generation's attitudes towards housing persist or revert to traditional conceptions of ownership when they become older?
2. Might co-living spaces for seniors become more socially acceptable and attractive?
3. With young adults currently driving demand for co-living spaces in Singapore, will co-living operators continue to cater to just this demographic, or expand their offerings to other groups?

In a plausible future, co-living may become an acceptable model for certain demographic groups in Singapore. Firstly, **co-living may become commonplace for young adults** who are constantly in search of community and new experiences. While there will always be demand for public housing, co-living may be able to plug certain perceived “inefficiencies” in traditional housing models through seamless access to lifestyle needs. However, the rapid growth of the industry may plateau due to high rental costs and land scarcity. Secondly, **non-kinship based co-living for seniors may become acceptable.** Seniors benefit from accessible healthcare services and social support structures, although the relatively primitive state of long-term palliative care limits the potential of elderly care-specific arrangements. Possible areas for improvement include the provision of more specialised care, barrier-free living environments, as well as leisure and entertainment facilities.



# DYING TO BE GREEN: THE NEW LIFE OF DEATH

By Gurubaran Subramaniam



# New "green" death options as viable eco-friendly alternatives to traditional post-death practices.

When most people die, their bodies are either buried underground after being filled with potentially toxic chemicals, possibly contaminating the soil and groundwater, or burned for several hours at temperatures approaching 1000 degrees Celsius, an energy-intensive process that emits up to 250kg of carbon dioxide.<sup>1</sup> What if your mortal remains could instead be broken down into nutrients for plants, freeze-dried and reduced into a powder that can be used as fertiliser, or converted by microbes to light, while being much gentler on the environment? These are increasingly plausible futures that could materialise given the rising popularity of new "green" death options as viable eco-friendly alternatives to the dominant funerary practices of burial and flame-based cremation.

Amidst the wave of eco-consciousness reverberating around the world, these traditional post-death practices are coming under question for their adverse environmental impact. Conventional burial takes up a lot of land space and requires steel or concrete burial crypts in the ground, and toxins from the embalming fluids and casket materials leak into the soil.<sup>2</sup> The average flame-based cremation on the other hand, requires about the same amount of energy used by a single person for an entire month and produces carbon emissions equivalent to two full car fuel tanks.<sup>3</sup> Columbaria where cremated ashes rest also require a lot of land, and individual niches are becoming increasingly expensive, particularly in high density urban centres where land is at a premium.<sup>4</sup> With urban populations projected to grow rapidly the next few decades, potentially creating further pressures on land demand, and the burgeoning ageing populations in many societies worldwide, it might be timely to consider adopting some of these alternative green funerary practices.

There currently are several different eco-friendly alternatives to flame-based cremation and conventional burial. Aside from being more

environmentally-friendly, these alternatives are considered to be more gentle post-death options, particularly in comparison to cremation, which involves burning corpses at high temperatures and grinding the remaining bones to ashes before they are returned to the deceased person's next-of-kin.

The most common is **natural burial**, where the body preparation involves either no embalming fluid or a non-formaldehyde-based formula. The body is then placed in biodegradable casket or shroud, buried in a grave with a simple headstone or marker, and left to decompose organically.<sup>5</sup> Most burials that are currently carried out under Islamic and Jewish customs would be considered natural burials.

Another method that is currently less mainstream but quickly gaining in popularity is **liquid cremation**, also known as resomation or aquamation. Liquid cremation involves an accelerated process of alkaline hydrolysis that reduces a corpse to a disposable liquid and sterile bone residue. The body is placed in a silk bag and loaded into a pressure vessel, which is then filled with an alkaline lye solution. The solution is heated to a temperature of around 160 degrees Celsius under high pressure, which prevents it from boiling.<sup>6</sup> Proponents of liquid cremation liken the process to a final soothing spa session, in comparison to the more forceful process of flame-based cremation.<sup>7</sup> In about three hours, the corpse is effectively dissolved into the end-products of a DNA-free greenish-brown liquid containing amino acids, peptides, sugars and salts, as well as soft and porous bone remains that can be easily crushed into dust. The effluent liquid can be discharged into the sewage system or used as fertiliser as it is very nutrient-rich.<sup>8</sup> The remaining dust is returned to the deceased's next-of-kin. Liquid cremation's carbon footprint is just a tenth that of flame-based cremation, and consumes about a quarter of the energy. While it may sound rather futuristic, liquid cremation is not entirely new. It was used to

dispose of the carcasses of animals infected with Mad Cow Disease, as it was found to be the only way to destroy the proteins that caused the disease.<sup>9</sup> It is also now used to dispose of cadavers that are donated to science.<sup>10</sup>

Yet another emerging method is natural organic reduction, or **human composting**, where a body is turned into two wheelbarrows full of usable and fertile soil in four weeks.<sup>11</sup> Composting is also not entirely new, as it has been long used on livestock carcasses. In this process, the body is placed in a reusable hexagonal steel container along with wood chips, alfalfa and straw. By carefully controlling the humidity and ratio of carbon dioxide, nitrogen and oxygen, the system creates the perfect conditions for thermophilic microbes to dramatically accelerate the normal rate of decomposition.<sup>12</sup> Pilot studies have shown that the entire body, including bones and teeth, can be reliably transformed into compost.<sup>13</sup> Recompose, the first operational human composting facility in the United States, accepted more than 50 bodies less than a year after opening in 2020, and has had nearly 800 individuals sign up for its death care services when they eventually die.<sup>14</sup> Recompose touts its human composting process as using an eighth of the energy of cremation and saving one tonne of carbon dioxide emissions per person compared to conventional burial and cremation.<sup>15</sup>

A more nascent and unorthodox option is **promession**, where the body is cryogenically frozen with liquid nitrogen to a temperature of -196 degrees Celsius, making it extremely brittle.<sup>16</sup> It is then mechanically vibrated and reduced into tiny crystallised particles, which can either be used to nourish plants or buried in a shallow grave to be transformed into soil.<sup>17</sup> Though it has only been used on pigs so far and is yet to be tested on humans, promession has been heralded by its founder as an environmentally-friendly and cost-effective process that could revolutionise the cremation and burial industries.<sup>18</sup>

Another novel yet promising option is **anaerobic bioconversion**, where decomposing bodies could be turned into light through the latent bioenergy within the corpse. At the time of writing, this vision is still being conceptualised and prototyped, but it involves breaking down corpses into their basic chemical and biological components through a process known as microbial

methanogenesis. The methane produced is then converted into light energy through another process, anaerobic carbon cycling.<sup>19</sup> Researchers from DeathLab at Columbia University—the pioneers and advocates of anaerobic bioconversion—envision it leading to death and remembrance being interwoven into municipal and social infrastructure, where these glowing vessels are placed in public spaces, forming constellations of light that illuminate urban areas such as parks and bridges while serving as memorial tributes to the dead. A human body can power a glowing vessel for up to a year before being replaced.<sup>20</sup>

We are seeing a rising interest in green death options, both due to a growing influence of environmental consciousness in shaping decisions surrounding post-death care, and the desire to leave a different legacy after death. Over half the respondents to a 2019 survey by the National Funeral Directors Association indicated that they would be interested in exploring these "green" funerary options.<sup>21</sup> Some celebrities have also become trendsetters in this regard: Beverly Hills 90210 star Luke Perry chose to be buried in a "mushroom suit" – a suit threaded with mushroom spores that break down and consume the body after death.<sup>22</sup> Several jurisdictions have also either legalised or are beginning to legalise the various new green death options. For example, liquid cremation has been legalised in the United Kingdom, Mexico, South Africa, 20 American states, several Canadian provinces and five Australian states.<sup>23</sup> Human composting is now legal in Washington, Colorado and Oregon, with California and Delaware possibly following suit soon.<sup>24</sup> We are also seeing a growing diversity of ways people are choosing to memorialise their deceased loved ones, such as opting for sea burials, inland ash scattering, and turning cremated remains into gemstones, tattoos or even corals.<sup>25</sup> Virtual memorial sites dedicated to the dead are also becoming increasingly popular.<sup>26</sup> On these sites, people can pay respect to and purchase virtual offerings for the departed, such as flowers and incense. Social media giants such as Facebook are also jumping onto the bandwagon, introducing new features to transform the profiles of users who die into memorial pages for their friends to pay tribute to them.<sup>27</sup>

In a plausible future, people could want more choice and control over what happens

to their bodies after they die and how they are remembered, beyond what is legally prescribed. As a result, conventional flame-based cremation and burial options might come to be perceived as outdated, obsolescent or even unacceptable. Additionally, with the younger and more vocal "Generation Z" being increasingly environmentally-conscious, pledges towards eco-friendly deaths could become part of low-carbon lifestyles as well as climate movements and rebellions. Demand for cemeteries, crematoria, and columbaria could also fall as green death options gain acceptance and become more common. The rising popularity of alternative remembrance and memorialisation forms might mean that there could be reduced demand and need for individual and physical markers to honour the dead. As a result, the memorialisation of the dead could fundamentally change, becoming decoupled from space and de-individualised, freeing up precious land space and allowing the energy saved to be channelled towards other uses.

## The rise of green funerary options will breathe a new meaning to life after death.

We could be approaching a juncture where urgent action is required to address climate change and when energy resources such as oil, coal and gas become increasingly scarce or obsolete. Urban death rates are also rising and could perhaps be exacerbated by more frequent and deadly pandemics and disease outbreaks. For instance, during the COVID-19 pandemic, crematoria and cemeteries in many countries were overwhelmed by the sheer number of bodies they had to process.<sup>28</sup> Therefore, with the emergence of the various green funerary options, death could eventually be reconceptualised to encompass more than just a teleological end of life and the symbolic remembrance of the dead. Instead, corpses could come to be seen as essential resources for the living, with more and more people wanting to "give back" to create new life in various ways after they die. This could pave the way for a new circular economy of life and death that could redefine the relationship between the living and the dead.

Currently, it is uncertain if the carbon emissions and energy consumption from cremation are particularly urgent problems that necessitate the shift towards more eco-friendly funerary practices. Singapore produced 46,429 tonnes of carbon dioxide as a result of cremation in the Financial Year 2019-20. However, this pales in comparison to the carbon dioxide produced by waste incineration: 868,800 tonnes.<sup>29</sup> Potential breakthroughs in innovations such as developments in underground space and carbon capture, utilisation and storage (CCUS) technologies could also negate concerns about the land- and carbon-intensive nature of current dominant funerary practices. It is also unclear if the emerging alternative forms of remembrance, such as virtual memorialisation, are actually replacing physical memorialisation or simply taking place alongside it. The shift away from current burial and cremation options could also potentially encounter socio-cultural obstacles in the form of entrenched traditions and beliefs, such as the annual Qing

Ming festival in several Asian societies and the Dia de los Muertos (Day of the Dead) celebrations in Mexico, where rituals such as cleaning up graves, setting up elaborate altars, and making physical offerings are central to remembering and honouring ancestors.<sup>30</sup> It might also be argued that the "fear factor" surrounding death may also cause the public to avoid the eco-friendly burial and memorial sites that may also double-up as civic spaces. However, the high demand for new flats in Singapore's Bidadari area—which used to be a sprawling cemetery—and the popularity of Green-Wood cemetery in New York—which hosts regular interactive events and performances featuring music, art, and film screenings—indicate that spaces intimately associated with death might not necessarily evoke fear and avoidance.<sup>31</sup>

Therefore, enacting a shift towards these eco-friendly funerary practices could have some larger benefits, particularly for land-scarce cities

and countries that are committed to reducing their environmental footprints. However, enacting a cultural shift on the issue of death is not a completely alien undertaking for many societies. To free up precious land for development, multi-religious Singapore successfully moved away from burial and towards cremation as the dominant funerary practice in the 1960s, underscoring the fluid conventions and asynchronous taboos surrounding death and funerary practices across the major religions and traditions.<sup>32</sup> Thus, it could be useful for governments to consider if the benefits from these new green death options would justify the trade-off in bringing about a new cultural shift to gain acceptance for them.

With these emerging eco-friendly funerary practices and memorialisation forms enabling more customisable and personalised deaths, it could also be worthwhile for governments to consider their potential implications, such as the impact on mourning, grieving, and remembrance rituals like funerals and wakes.

Given the rising popularity of these green death options, it might also be useful to think about the necessary regulatory reforms surrounding funerary practices and urban "deathscapes". This would include the legalisation and normalisation of green death options as well as the liberalisation and diversification of the funeral and death industries. In many jurisdictions, archaic laws governing death and dying that are premised on narrow definitions of cremation and burial are leaving promising emerging death technologies without the legal ground to establish themselves, preserving the dominance of traditional big players in the funeral and death industries such as casket companies and crematorium operators.<sup>33</sup> For example, in Kansas, the legal definition of cremation requires "the separation of the flesh from bone by the destruction of the flesh," which does not apply to several of the newer green death options.<sup>34</sup>

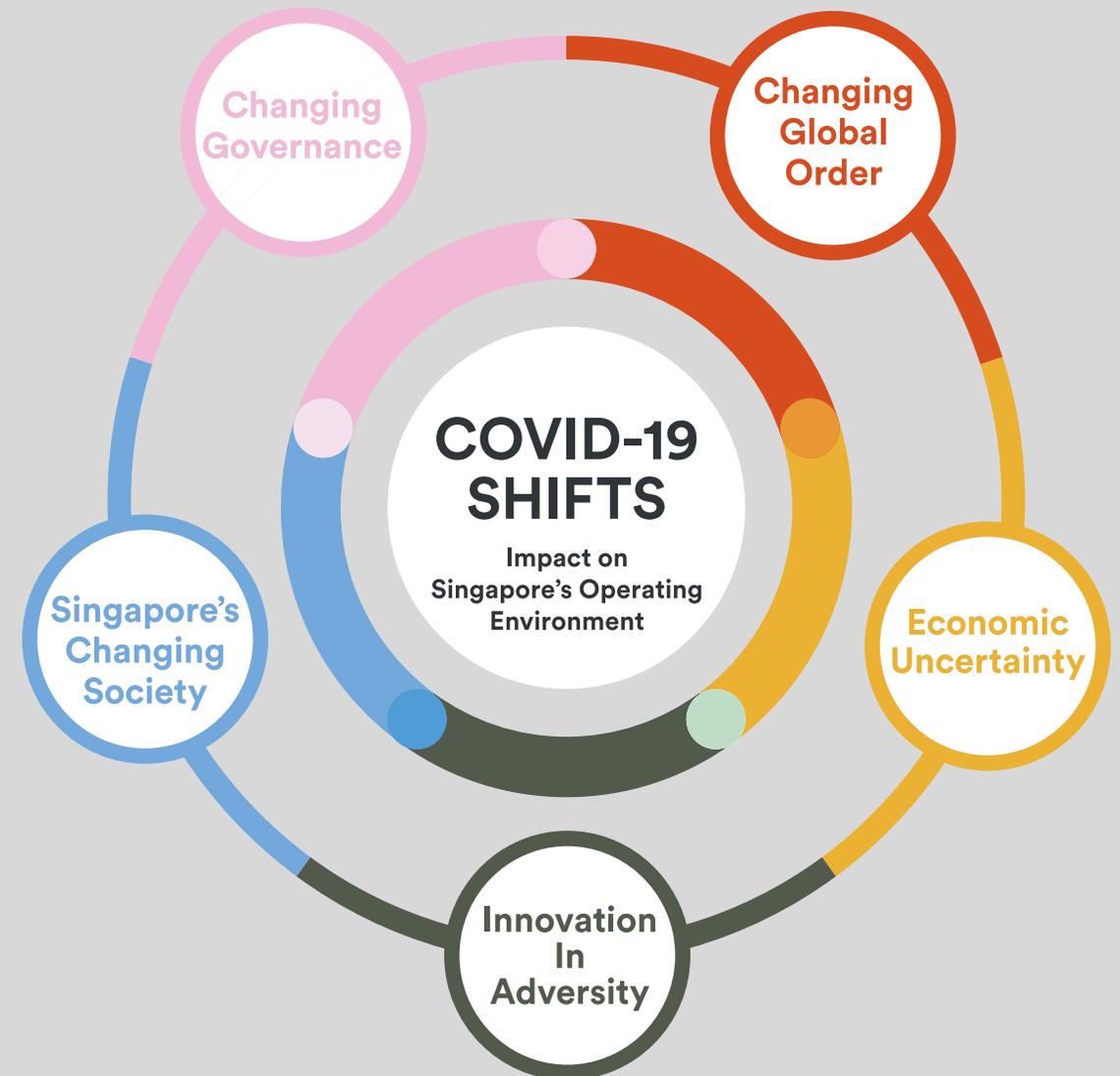
## Will the utilitarian use of the dead bodies as resources for the living lead to significant cultural re-orientation?

Finally, would the utilitarian use of the bodies of the dead as resources for the living be a particularly significant cultural re-orientation? In several countries, including Austria, Belgium, Chile, Singapore and Spain, opt-out organ donation programmes have already legitimised and institutionalised the removal of functioning organs from the dead for the benefit of the living.<sup>35</sup> Therefore, a future reality where this utilitarian view of the dead is extended to entire bodies may not be too far-fetched in many parts of the world.



# WHAT DOES FORESIGHT WORK LOOK LIKE IN A PANDEMIC?

By Liana Tang



In December 2019, news of a deadly virus was trickling out of Wuhan, China. The world took some time to process the reality and severity of the virus as it spread rapidly: our global interconnectedness spurred exponential spread across the globe, sparing few countries. In March 2020 alone, Singapore saw weekly average cases rise from under 10 to over 50 per day. Globally, we saw the first thousands of deaths from COVID-19. That month, the World Health Organisation declared COVID-19 a global pandemic.

Singapore's public health response had been ramping up in the early days of the pandemic, riding on contingency plans and infrastructure developed as part of lessons learnt from the SARS outbreak in 2004, caused also by a coronavirus. Yet we would eventually learn that COVID-19 was a more infectious variant, and bore characteristics that Singapore was not as prepared for—mask-wearing for instance was key due to the high rate of asymptomatic transmission, and mask production centres around the world saw record demand, making maintenance of Singapore's own stock of masks difficult. A more complex and fast-paced public health response was necessary, especially as hitherto unthinkable measures, such as border closures, had to be implemented. Complicated repatriation plans and sudden supply chain disruptions added to the strain on society, public services and businesses alike.

In the months following March 2020, the Public Service came under significant strain to keep up with effective policy and public health responses in a chaotic environment. Every day, the situation evolved quickly—the number of cases in neighbouring countries, the labour shortage in critical points of our supply chains, border closures that other countries implemented with short notice, panic buying and the struggle that local logistics networks experienced in restocking essential goods quickly. The Public Service, like many elsewhere, had to “forward plan” on a very short time horizon, feeling its way in the dark.

### CSF'S COVID-19 WORK

In March 2020, CSF set out to adapt our foresight workplan to cater to the COVID-19 situation. We wanted to help our colleagues navigate the chaotic COVID-19 environment. We set out on

producing research and facilitating policy discussions that would help the system anticipate new shocks, consider signals of change and opportunities, and avoid the unintended consequences of quick policy moves. We approached the COVID-19 work in several ways.

#### *Using foresight tools to have policy discussions*

CSF designed and facilitated policy discussions using tools such as the Futures Wheel, where plausible future events arising from COVID-19 were used to brainstorm higher order implications. Surprising higher order events and multiplier nodes were identified for policy planning.

#### *Providing a systematic way of looking at change—identifying “shifts”*

To help policy makers observe the evolving environment in a more systematic way, CSF introduced a frame for distilling signals of change. We organised information into “shifts”, which described how several driving forces were changing in pace, texture and uncertainty. This was presented to the policy community to facilitate discussions on stress testing current responses and identifying gaps. The shifts discussions were also adapted to several policy platforms, as we partnered with agencies that were keen to pursue more in-depth discussions to inform planning for the coming year and beyond. Other policy arms used the shifts as a reference frame to formulate their own policy agendas. An abridged version of the shifts, *How COVID-19 is Reshaping the World*, is reproduced here in this section.

#### *Deep diving SPOTLIGHTS: Identifying smaller shifts in quick and dirty deep dives*

In a rapidly evolving environment, signals of change around the world served as useful reference points for Singapore—from innovations in service delivery and safe management, to cautionary tales in a range of domains such as cybersecurity, data privacy, and new vulnerable groups. CSF conducted deep dives into specific strained domain areas, bringing in external perspectives, and contextualising them to Singapore, to spark conversations about these domains. We called these deep dives COVID-19 SPOTLIGHTS.

We produced these fortnightly and disseminated them to the Public Service leadership and the broader policy community. By November, as the COVID-19 situation stabilised, CSF ceased producing SPOTLIGHTS. Seven such SPOTLIGHT issues have been adapted and reproduced in this section.

### APPROACHING OUR COVID-19 FORESIGHT WORK

Embarking on pandemic foresight work was challenging. While the WHO declared COVID-19 a global pandemic in March 2020, the world was still in sense-making mode, producing so much information that it was difficult to cut through speculation and uncertainty in order to unearth useful signals and analyses. We approached this challenge in several ways:

#### *Look back to look forward*

In the practice of foresight, a good understanding of history is helpful. We set aside time to look into the impact of past crises, including past pandemics, and identified major changes arising from them. History teaches us broad lessons that can help us frame today's problems. In addition, a scan of our past work in driving forces research across decades of scenario planning also provided a useful reference for where big shifts were fairly enduring, even if textures of change evolved over time. Our look back to past crises, *Four Lessons from History*, is reproduced in this section.

#### *Scan and interrogate*

We encountered some major info-overload during this time—even credible news sources were inundating us with signals and analyses every other day, and it was challenging to tell hype from reality, noise from valuable insight. We narrowed our sources to several reliable news sources and periodicals, and used our preliminary “shifts” frame as a way to organise our resources. Our in-house information management capability came in helpful here. We then set aside time for the team to make sense of the research we were reading, and to interrogate each others' analyses. These exercises also served to stress-test our organisational frame. With this discipline in place, major shifts and signals were distilled with some rigour, before being polished for publication in a matter of weeks.

#### *Community of practice was mutually reinforcing*

To ensure we did not have too many blind spots, it was important that we workshopped our work with a community of practice and with thought leaders. Several platforms were important for this, such as our Public Service futures community, which we convene in regular Sandbox events. International counterparts were also another key resource for exchanging notes on each others' analyses of the COVID-19 situation, as well as our approach to foresight during the pandemic. This mutually reinforced our foresight work—several Sandbox community members also workshopped their COVID-19 work, and the insights from these discussions added value to other members' work.

Many Public Service agencies embarked on their own COVID-19 foresight work. Here are some of their stories.

# PUBLIC SERVICE FORESIGHT IN A TIME OF COVID

## **EDB** Economic Development Board

Soon after the global outbreak started, we had to take a step back to separate signal from noise and try to make sense of the external world. We rapidly landed on three questions of interest to guide our foresight efforts:

- What assumptions underpinning the success of EDB's work may no longer hold in a post-COVID world?
- What threats and opportunities should EDB respond to, and what should we do differently?
- When should we act?

Having defined what we were interested in, we undertook the following to translate our sensing and foresight work into concrete action:

- We developed hypotheses addressing the questions above.
- We leveraged on the existing sensing and scanning platforms, channels, and processes across the organisation, undertaking directed sensing to test our hypotheses, and to constantly update and challenge our view of the world.
- We socialised our thinking within the organisation, and incorporated our recommendations into our internal planning processes, including the setting of corporate priorities and workplans.

The true test of our work is the extent to which it influences behaviour and drives change in the organisation. Some of the outcomes we contributed to include the commissioning of new strategy workstreams that are still ongoing (for example, reviewing our hub strategy in light of COVID), as well as the setting of organisational priorities around seizing specific opportunities (for example, investments arising from supply chain diversification).

## **STB** Singapore Tourism Board

In March 2020, WHO declared COVID-19 a global pandemic. One of the task forces set up to deal with the impact of COVID-19 was the Economics Opportunities Task Force Tourism Sub-Group. It was formed to transcend the immediate firefighting and proactively reimagine travel and tourism to future-proof our industries.

In the midst of the crisis, we conducted in-depth interviews with 34 key business leaders across many sub-sectors, ranging from tourism industries like the hotels and cruise industries to non-tourism players like insurance and big tech firms. The conversations were inspiring and hopeful, and we identified economic opportunities based on key consumer and business shifts. These were distilled into recommendations that were verified and validated with our interviewees and industry partners. Many of these recommendations have since been implemented. They include a concerted effort to stimulate Singapore's domestic demand to sustain tourism businesses as global travel restrictions continued, and a calibrated approach towards reopening such as piloting cruise and MICE events. Mid- to longer-term opportunities were also proposed in the areas of digitalisation and regionalisation to capture growth and thrive.

## **SSG** SPORTSG

When COVID-19 hit Singapore, sports facilities and activities came to a halt. For an agency advocating sport to achieve personal, social, and national outcomes, the impact of COVID-19 was deep and far-reaching. By June 2020, we concluded that COVID-19 was not going away quickly. There was an urgency to understand the plausible ways our operating environment might shift, review existing strategies, and determine potential implications for SportSG and the sporting ecosystem.

After identifying emerging shifts from an environment scan using the PESTLE (political, economic, social, technological, legal, environmental) framework with insights from CSF's COVID-19 SPOTLIGHT pieces, as well as primary and secondary research, we determined critical uncertainties associated with each shift observed. These uncertainties were validated with CSF before we developed and prioritised scenarios to design our strategies for the next two years.

This exercise and the inputs from CSF were invaluable in generating new lines of inquiry that led to updated corporate priorities, strategies and innovations to bring sport back safely.

## APPROACHING ENDEMIC COVID-19

By early 2021, there was reason to be optimistic about vaccine distribution. It became increasingly clear that the public health approach to COVID-19 had to move to a phase where the virus was endemic and accepted as such. This had several implications, especially so for a small country with many unique constraints. The transition to endemic COVID-19 was not without challenge, such as taking a measured approach to reopening of borders and travel, managing the need for continued safe management measures such as social distancing and mask-wearing, and anticipating the persistence of some pandemic practices like online events or working from home. It was also important to consider how to communicate these expectations to a war-weary public. CSF reviewed the research done in 2020, considered the main policy challenges of a transition towards endemic COVID-19, and in April 2021, convened policy roundtables around what we termed Long COVID. These discussions contributed to the identification of major policy challenges in managing the transition into endemic COVID-19.

## REFLECTIONS

There were several challenges and learning points from doing foresight in a pandemic.

### *Being nimble was key*

CSF had to quickly sense-make, reprioritise work, and get up to speed with the policy concerns of the day. We also had our own resource constraints as some members of the team pitched in to assist in COVID-related operations during this time. As our audience was in crisis mode, they had to read work that used current policy vocabulary and which had direct relevance to their concerns. CSF's location in the centre of government and within in the Strategy Group was instrumental in this.

### *Code-switching time horizons was necessary*

CSF traditionally operates in the mid- to long-term, scanning for emerging issues and extrapolating into the 10 to 15 year time horizon. We had to switch to producing work that spoke

to the very near term, looking ahead no further than six months to a year. As we worked on Long COVID, our time horizon was stretched only slightly to two to three years.

### *Managing "noise" to pick out useful insights was challenging*

We found that traditional human capacities were important to navigate information overload. Digital tools were easily overwhelmed and the novelty of the subject meant there was little knowledge of how to filter information more meaningfully. We relied on our professional librarian and the diversity and discipline of the CSF team to cut through the noise and make sense of the COVID-19 environment.

### *Foresight networks helped bring further rigour to the work*

Our relentless capability building efforts over the years, both internal and external to government, paid off. It was important that as we sense-made in an uncertain and chaotic environment, we had reliable networks to consult. The internal Sandbox community convened several times in 2020 to build off each others' work, and to share insights. We also consulted local think tanks and futures units in institutions like the National University of Singapore. International counterparts such the OECD's Strategic Foresight team and the UK's Development, Concepts and Doctrine Centre were also extremely helpful.

# FOUR LESSONS FROM HISTORY

By Calissa Man and Louise Cheng

As the COVID-19 crisis continues, we have looked to past security, health and environmental shocks for ideas on how societies, economies, and governance may change as a result. While the past does not wholly determine our present, the study of other major shocks offers key insights on how human behaviour may change (or not) over time. Here, we offer four lessons from the past.

**LESSON 1:  
OLD DIVIDES, NEW VULNERABLES**

**LESSON 2:  
POLITICAL UPHEAVAL**

**LESSON 3:  
BIGGER GOVERNMENT, BIGGER BUSINESS**

**LESSON 4:  
GREATER FRAGILITY**



### LESSON 1: OLD DIVIDES, NEW VULNERABLES

Past crises deepened or accentuated existing divides around race, age, and class. For instance, the nomenclature for new infectious diseases (for instance the Spanish flu, the Asian flu, Hong Kong flu, and COVID-19 (“the Wuhan virus”) can normalise racial prejudice. Reforms mandated by the International Monetary Fund (IMF) in response to the 1997 Asian Financial Crisis cut public spending on health and education, increasing the rich-poor divide in affected countries. In Cape Town, the 1918 influenza pandemic justified the enforcement of racial segregation under the pretence of public health concerns. The forcible displacement of black communities later served as the urban planning blueprint for 20th century apartheid in South Africa.

Past shocks also created new vulnerable groups. As with the current pandemic, workers in the travel, tourism and retail industries experienced heightened unemployment and job disruption during past pandemics and 9/11. In the long term, survivors, first responders and frontline medical staff faced devastating psychological aftereffects, suffering from depression, post-traumatic stress disorder (PTSD), substance abuse, and suicide ideation 5–10 years after the 9/11 attacks, SARS outbreak and 3/11 Fukushima Daiichi nuclear disaster.

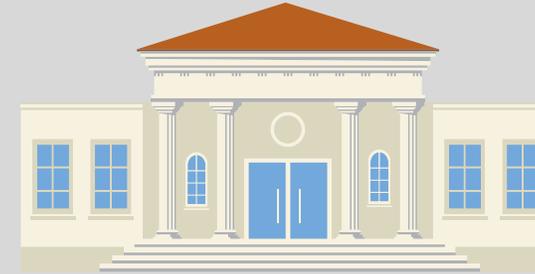


### LESSON 2: POLITICAL UPHEAVAL

Past shocks created openings for new political leaders and movements. The 1918 influenza pandemic catalysed India’s independence movement, as high death tolls and inadequate healthcare fuelled widespread anger against the colonial administration. Grassroots activists won locals over by filling the public health vacuum, gaining hitherto-lacking support for the independence movement. Following the 1997 Asian Financial Crisis, political leaders used the economic crisis to appeal to urban and rural poor with more inward-oriented development regimes.

Past shocks also caused shifts in international politics, by fomenting mistrust in global superpowers and Western international institutions. During the 2009 H1N1 pandemic, the United States outbid developing countries for vaccine doses and delayed its promise to provide vaccines for developing countries, tarnishing its international image. Moreover, the World Health Organisation (WHO) declared the H1N1 a pandemic based only on the new virus’ transmissibility without considering the severity of the strain. Governments later blamed the WHO for creating an unnecessary surplus of vaccines that strained national coffers. The IMF’s role in responding to the 1997 Asian Financial crisis generated distrust in Asian economies towards the Bretton Woods institutions, initiating their move to seek alternatives to the IMF and World Bank.

Past shocks have also revealed signs of “medical nationalism”. During the 2009 swine flu pandemic, wealthy countries dominated the procurement of the swine flu vaccine. As a result, developing countries had delayed access to the swine flu vaccine, in much smaller doses. This shares parallels with the COVID-19 pandemic, as the world’s biggest economies pursue nationalistic “sweetheart deals” for preferential access to COVID-19 vaccines.



### LESSON 3: BIGGER GOVERNMENT, BIGGER BUSINESS

Government interventions have played a large part in any crisis management scenario. Privacy protections were often the first to be eroded. Following 9/11, the “War on Terror” led to a state of permanent war which gave way to a new normal of increased surveillance. In the wake of SARS, new national public health agencies were created and disease surveillance programs were strengthened, often with easy access to citizen data. The expansion of government oversight at the expense of privacy became accepted as the price of continued vigilance.

The scale of past natural disasters also expanded government responsibilities. Hurricane Katrina set a precedent that the federal government would fund disaster recovery efforts. Similarly, the 3/11 Fukushima Daiichi nuclear disaster drove the launch of Japan’s Reconstruction Agency as citizens called for greater prioritisation of disaster preparedness and recovery. Economic downturns exposed weaknesses in welfare systems, forcing governments to rethink their policy measures. The Asian Financial Crisis exposed the inadequacies of relying solely on economic growth for social protection, justifying the implementation and expansion of previously unpopular unemployment insurance and social safety nets. Post-crisis, many of these measures proved difficult to roll back. However, support for welfare conflicted with fiscal constraints during recessions. As government deficits and debt increased after the 2008 Global Financial Crisis, cuts on social welfare became commonplace. This sparked social unrest and a political vacuum exploited by movements such as the Tea Party and Occupy Wall Street.

Past shocks also enabled the consolidation of economic power by large businesses. The 2008

Financial Crisis led to an unprecedented wave of consolidation, as floundering institutions such as Bear Stearns and Merrill Lynch were bought by giants such as Bank of America and JPMorgan Chase. Similarly, SARS created new e-commerce hegemony, Alibaba and JD.com as more consumers stayed home. Surging stock prices, healthcare expenditure and panic-buying for health-related products during health shocks led to the further consolidation of Big Pharma.



### LESSON 4: GREATER FRAGILITY

While big businesses benefited, past crises exacerbated issues faced by vulnerable groups. There was a disproportionate rise in youth unemployment following the Asian Financial Crisis and Global Financial Crisis, causing a higher likelihood of long-term ‘scarring’. Austerity measures during past recessions also cut public spending on education and healthcare. This disproportionately lowered school enrolment rates among the poor, exacerbating societal inequality and dampening future productivity.

### CONCLUSION

While every shock has its unique tail risks, there are some common effects that we can watch for in future shocks. We should consider how past shifts in society, governance and the economy as a result of previous crises can inform our understanding of COVID-19 and future shocks.

# HOW COVID-19 IS RESHAPING THE WORLD

By Seema Gail Parkash and Liana Tang  
With thanks to the CSF Team  
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The World Health Organisation (WHO) declared COVID-19 to be a public health emergency of international concern in March 2020. At the time, few could have imagined the immense toll of the disease, with thousands of fatalities reported on a daily basis around the world. Even fewer could have imagined that the disease would up-end our ways of life so comprehensively or raise the spectre of a global depression.

However, the driving forces reshaping our lives did not all emerge overnight—COVID-19 has accelerated many pre-existing trends. It has also introduced new ones. Some of these have resulted in shifts that may usher in great transformation. Here, we examine some of the ways in which COVID-19 is reshaping the world in the medium to long term and share five shifts in the environment that we are observing.



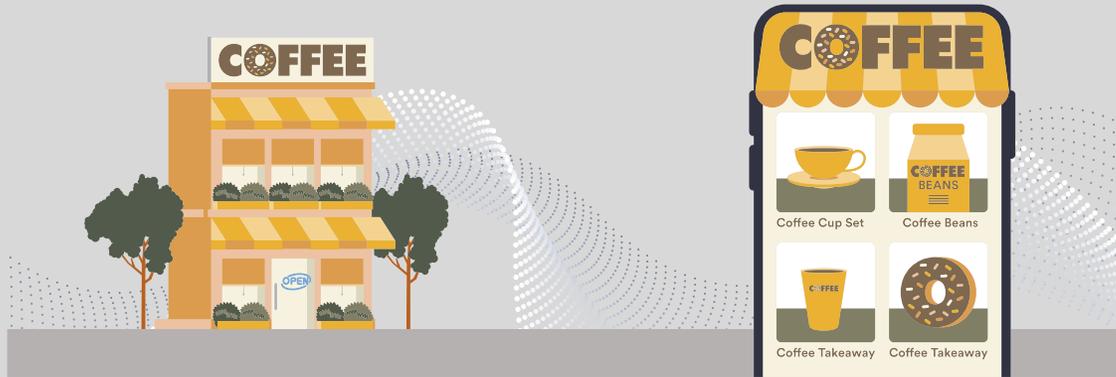
## SHIFT 1: GLOBALISATION WILL BE REWIRED

The notion that globalisation—cross-border flows of trade, investment, technology, data, information and people—is in retreat is not new. “Slowbalisation” or “deglobalisation” has been debated since the 2007–2009 Great Recession, particularly amidst the United States’ (US) “America First” policy and the US-China trade and technology conflict of recent years. While the pandemic appears to be accelerating this trend, perhaps what we are seeing is a rewiring of globalisation instead.

The pandemic has prompted governments and businesses to view the interdependence of global supply chains, particularly for critical supplies such as medical equipment, pharmaceuticals and food, as a vulnerability. Some countries and regional blocs, such as the US, European Union (EU), China and India, have enacted export prohibitions or restrictions on such supplies; and many countries are rethinking strategic autonomy.<sup>1</sup> Businesses such as Google and Microsoft have accelerated efforts to diversify production from China to Southeast Asia.<sup>2</sup> The context for reconfiguring supply chains is increasingly anchored on resilience, not “decoupling”.

However, the reconfiguration of supply chains has practical limitations given the significant cost of retreating from a free market strategy, the continued need for raw materials, governance and strategic policy capabilities, and countries’ unique demographic challenges. Taken together with travel restrictions, and the likelihood that short-haul travel will recover faster, we might see greater regionalisation of supply chains in the future, rather than a major shift towards onshoring. Nevertheless, onshoring will continue in some areas as the world recovers and continues to compete in the development of emerging strategic technologies.

There is ample reason to believe that globalisation may be changing in nature rather than in retreat. China continues to push forward with the Belt and Road. The boost in cross-border e-commerce could expand export opportunities. New remote work models could spur the offshoring of more services helped by digitalisation.



## SHIFT 2: THE STRUCTURE OF ECONOMIES COULD BE FUNDAMENTALLY ALTERED

The pandemic is not only reshaping supply chains. The need for social distancing to contain the spread of COVID-19 has dramatically accelerated digitalisation and has had far-reaching impacts on industries, employment and even economic mind-sets.

Globally, lockdowns have pushed more and more activities of daily life online, adding momentum to the digital transformation of industries—not least the retail industry. Even as many brick-and-mortar stores close, e-commerce platforms have seen global sales surge. At the height of the lockdowns, Amazon was reportedly earning US\$11,000 per second. In China, JD.com and Alibaba reported Q1 2020 year-on-year growth of 20 per cent and 22 per cent respectively.<sup>3</sup> Jumia, one of Africa’s largest e-commerce operators, reported a four-fold increase in sales of groceries in the second half of March 2020, compared with the same period in 2019.<sup>4</sup>

This accelerated shift towards online retail could contribute to the consolidation of economic power by large businesses, as smaller businesses are less likely to establish and sustain a presence online. In addition, those industries that can capitalise on digitalisation—not least the tech giants—will emerge as “winners” from the crisis. For instance, industries that can shift entire jobs online could benefit from the best global talent even as they reduce overheads, thus enhancing their competitiveness.

Apart from digital transformation, the pandemic also appears to be accelerating the rise of precarious, short-term gig employment. Globally, unemployment has skyrocketed—projections forecast a drop in working hours equivalent to 305 million full-time jobs in Q2 2020.<sup>5</sup> With the dire economic outlook, the unemployed and self-employed are turning to the gig economy and short-term contract employment—which lack comprehensive benefits and protection—to make a living.<sup>6</sup> This trend could be exacerbated by a wave of defaults on household, corporate and government debt, given the massive accumulation of such debt in many economies and the acute shortage of US dollar funding brought about by the economic toll of the pandemic.

Nevertheless, it remains to be seen if the trend of a “contingent workforce” is temporary or more permanent. It also remains to be seen if such jobs will continue to lack comprehensive benefits and protection. The pandemic has demonstrated that many essential societal services are not well-paid nor valued, thus challenging the conception of (economic) value. This could lead to changes in how we remunerate “essential workers” such as cleaners, security guards and delivery people, who tend to be part of the contingent workforce.



## SHIFT 3: NEW INNOVATIONS AND INCREASING DIGITALISATION WILL BIRTH UNINTENDED CONSEQUENCES

Despite the acceleration of digital transformation, “online” will not replace “offline” entirely. Remote work, e-learning and telemedicine may become more widespread, but many functions will still require a physical presence. There will be demand for innovations that facilitate safer interactions both offline and online; there will also be demand for innovations that circumvent supply chain or labour disruptions.

The pandemic has already sparked numerous product and process safety innovations. Product innovations in sanitation, such as anti-microbial self-disinfecting coating or Nippon anti-viral paint, if effective, would be a boon for high-traffic areas such as transport hubs and workplaces. Process innovations such as contactless options—for deliveries, orders at restaurants, payments, building entry—are also being introduced. Such innovations may be “high-tech” or “low-tech”. For example, Starship robots have delivered groceries in the UK.<sup>7</sup> In other countries, including Singapore, contactless delivery may involve a person leaving groceries on the doorstep.

The pandemic has also seen innovations that circumvent supply chain or labour disruptions. These might involve a new twist on existing techniques. For example, faced with shortages of ventilators, doctors in the US successfully adopted “awake or self-proning” for deteriorating COVID-19 patients—getting them to lie on their stomachs or sides—to improve oxygen saturation levels, even though the proning technique was traditionally applied to sedated patients on ventilators.<sup>8</sup> Innovations that circumvent supply chain or labour

disruptions might also involve new or expanded applications of existing technologies or products. For example, the agricultural drone maker XAG mobilised drones for use by rice farmers in China facing rural worker shortages that were exacerbated by COVID-19.<sup>9</sup>

While it is uncertain if these innovations will endure post-pandemic, increased demand for safer interactions as well as digital platforms, software and hardware will certainly have unintended consequences. For instance, the emergency roll-out of new safety innovations without regulatory scrutiny, such as human disinfection tunnels, could harm the people who use them.<sup>10</sup> As another example, new tech giants will almost certainly emerge amidst a world already unclear about how to deal with taxation, security and other regulatory issues vis-à-vis existing ones. Yet another unintended consequence could be a rise in carbon emissions as countries re-open. This could be a result of increased energy demand from widespread digital transformation, as well as delayed transitions to renewable energy amidst depressed oil prices and acute financial strain from the crisis.



#### SHIFT 4: EXISTING SOCIO-ECONOMIC INEQUALITIES WILL DEEPEN AND NEW ONES WILL BE CREATED

We must not forget those who may be left behind, beyond vulnerable groups such as the elderly and the poor who may lack technological access or know-how. COVID-19 brought to the fore the vulnerabilities in many societies that had already been present for a long time, such as the faultlines of race, migration status and income. In many cases, these divides influenced access to healthcare as well as decent living and working conditions—including adequate physical space for social distancing. Looking ahead, existing socio-economic and gender inequalities may deepen further. The crisis could also change the texture of existing fault-lines, while creating new ones.

With remote work largely limited to knowledge workers, divides between them and other gig, skilled and informal workers may deepen, even with government assistance to the latter. Moreover, increased automation for essential goods and services to reduce the risk of disruption in a crisis could lead to a further loss of stable but low-wage jobs, deepening the divide between rich and poor. These trends could be exacerbated by the absence of social levelling services, such as schools, child-care centres and workplaces, during extended or recurring lockdowns. For example, the quality of the e-learning experience is dependent on not just access to technology, but also the home environment—parents' educational qualifications and technological know-how dictate the support they can provide, and the availability of a conducive physical space at home is crucial for learning. Similarly, working productively from home relies on

adequate child- and elder-care, and the equitable distribution of caregiving responsibilities at home.

New faultlines and challenges to the social status quo are also likely to emerge. Inter-generational inequity may widen. Retirees who work part-time, being particularly vulnerable to the virus, may be more cautious about social and economic activities even after lockdowns lift, and may be less likely to explore employment opportunities given the heightened risk of exposure. They may find themselves less able to contribute to the community and further withdraw from society. Youth, on the other hand, could be disproportionately impacted by protracted unemployment or under-employment due to lack of work experience. This could have several consequences, such as the rise of fragmented, generational politics, poor social cohesion, and a rise in migration or delinquency.

Intra-generational inequity may also widen. Unlike poorer youth, whose careers and ultimately wages and lifestyles have been set back, some youth from well-to-do families may be able to capitalise on their families' social capital to land decent jobs. Others may ride on family wealth to emerge from the crisis with better credentials, such as higher degrees or unpaid internship experiences, which will position them well for high-paying jobs post-pandemic. New groups may also become vulnerable, when they were not before. These might include those earning high but unstable incomes prior to the pandemic, such as real estate agents.

It is also clear that the incidence of mental health issues will rise and psychological recovery will take a long time. Multiple groups will suffer from psychological trauma. Sufferers could include healthcare workers, recovered patients who spent weeks or months in isolation while sick, and children who endured confinement with their abusers. The elderly, the poor and those living with disabilities will likely also be affected disproportionately. Elderly loneliness could increase and mental acuity could decline during the crisis, due to the loss of daily routines, for instance. The jobless poor could suffer from high levels of anxiety and stress. There could, however, be psychological resilience “winners”—such as Generation Z and extreme introverts, who may thrive on digital platforms.



#### SHIFT 5: THE RELATIONSHIPS BETWEEN GOVERNMENTS, BUSINESSES AND CITIZENS WILL BE RESHAPED

The pandemic has arguably ushered in the return of Big Government. At the same time, it requires governments to navigate new relationships with the private sector as well as the people sector, upon whom the success of measures depends. The pandemic also requires governance methods to evolve, but this may present new risks.

The pandemic seems to call for measures on a scale that only governments can institute and in other times would be deemed draconian; these include lockdowns, surveillance, movement control orders and border closures. The commensurate enforcement capabilities similarly call for large state machinery. It remains to be seen if Big Government will reinforce or restore public trust in state authority and infrastructure, as well as public service capability, or further erode it. The effect on public trust will likely depend on the extent to which the measures are seen to be successful in containing the spread of COVID-19.

However, even Big Government finds itself operating in a new era of private provision of public goods. Large private corporations have arguably provided essential infrastructure amidst the pandemic. For example, the Singapore government disseminates “Gov.sg” COVID-19 updates via the messaging platform WhatsApp. Governments will increasingly have to reconcile their conceptions of the public good with the interests of private corporations, taking into account the concerns of the public. The data governance debate triggered by track-and-trace solutions, such as the Apple and Google Exposure Notification (EN) API, is a good example of the tensions that might arise. While it is clear that new relationships are needed with the tech giants in

particular, a healthy balance between cooperation and contention is uncertain.

The pandemic has also forced governments—which typically move fairly slowly—to move much more quickly. Rapid spread of COVID-19 has forced governments to institute and adjust policy measures and even legislation on a near daily basis. It has also prompted the lifting of regulations in many areas in efforts to manage the crisis. These include de-regulation to expedite the development of vaccines and therapeutics, and the relaxation of regulatory vigilance around issues such as privacy. The pandemic has also led to active consideration or even implementation of hitherto unthinkable policy measures, such as unemployment insurance and “helicopter money”.

Even as governments develop the capacities to prototype and iterate in order to move faster, new risks loom large. If the government is too effective, this might reduce the private and people sectors' drive to innovate, and increase unsustainable expectations of government. Avenues for abuse also open up. For example, harvesting biometric data en masse to better track and contain the pandemic could allow governments and corporate intermediaries to get to know citizens well enough to predict or manipulate citizens' feelings to sell them anything, be it a product or a politician.<sup>11</sup>

Corporate giants that have facilitated pandemic management efforts may not be taken to task to surrender or protect citizen data post-COVID-19, and governments similarly may not introduce adequate safeguards. This may raise privacy concerns in the shorter term and fear of autocratic governments or unscrupulous powerful corporations in the longer term.

## CONCLUSION

These are just some of the ways in which COVID-19 is reshaping the world. While the pandemic has emerged as a gamechanger that will have a profound and complex effect on societies, economies and the environment, the trajectories of the trends are in many respects still uncertain and bear watching.

Governments, corporations and citizens have the agency to influence the outcomes regardless of the degree of uncertainty, albeit to varying extents. It is timely to consider if existing strategies and practices are adequate for the challenges ahead.

# WHO ARE THE LOST GENERATION OF COVID-19?

By Liana Tang



In the early days of the COVID-19 pandemic, safe management restrictions such as social distancing created surreal learning and social environments for everyone. As many businesses tightened their financials, cut back on staff, or folded altogether, many found jobs hard to come by. COVID-19 has created a new class of vulnerable, spanning life stages, geography, and socioeconomic status.

One group that feels unique impact is young people, especially those experiencing socially distanced learning environments and going through the transition from formal education into employment. Some commentators have warned that youth undergoing life phase changes during COVID-19 may be the “lost generation” of our lifetimes.

A year and a half into the COVID-19 pandemic, youth unemployment is at a high. Although experts say that youth unemployment is typically transitional and short term, the question is whether this crisis is different, and such unemployment could thus be more prolonged than before. There are worries that COVID youth have been denied the traditional opportunities and starting points that generations before enjoyed, starting out formal employment later on in life and subsequently delaying other life phase events, such as marriage, parenthood, home ownership, due to financial knock-on effects of these COVID delays. Retirement adequacy would also be a concern, since they had lost some years of productive life. Not to mention the many limitations to social activities during their years of self-discovery in teenage years and in higher education—surely their social capital and interpersonal skills would be affected.

I think calling them the next lost generation is unhelpful, and I will explain why.

### THE BEST LAID PLANS ARE SUBJECTIVE

Boomers, having come of age during a time of relative affluence and economic growth post-World War II, have long been known to project predictable life trajectory expectations on their children: get a good education, seek stable employment, or start a business that does well, buy a house, start a family, and make sure your kids get the same opportunities or better. Their

children—Gen Xers and Millennials—have largely sought similar trajectories to varying degrees of success, and have perpetuated the same aspirations and expectations onto their children.

These expectations and aspirations have not been adjusted despite how much our external environment has changed. In these same decades, we have seen tremendous economic growth, unprecedented connectivity, innovations in technology that have profound impact on lifestyles, interpersonal relationships and identity.

It is remarkable how many children of Boomers have failed to reach the milestones laid out in these traditional trajectories, many facing serious debt problems, mental health issues and existential crises. Chasing traditional markers of success has also caused negative social impact in some cases—the environmental impact of high consumerism, the tremendous debt from higher education and mortgage servicing, the shame from having fewer or no children—and the psychological impact and social stigmas created are not insignificant.

It is little wonder then that Millennials, having realised that the drudgery of work will only reward you with time and retirement very late in life, aspire less towards retirement and more towards long-term financial freedom, such as working longer but giving themselves more flexibility. Chasing traditional life markers such as family and home ownership also makes it harder to enjoy life experiences without sacrificing physical and mental health. It would be interesting to see if the Gen Zs also feel the same way.

How have these traditional best laid plans been planned? What was it about the environment that told us that these were the markers of a good life, and that these markers ought to be followed in sequence? Did these plans evolve as lifespans extended dramatically in the last few decades? As jobs and skills were disrupted time and time again due to technology? What about interconnectedness, and ease of travel, which has produced a generation more connected and knowledgeable than ever?

The truth is that trajectories to success—and there are many—should be adjusted with the times, and with generational experiences and

aspirations. Worrying that the new generation is not hitting the same life goals as their elders had at their age, and whether they are on track to achieve subsequent ones, might be missing the point.

### LIFE CYCLES ARE BEING RE-WRITTEN ALL THE TIME

We are living longer, healthier lives. Technology and innovation have created social and economic dynamism that the adaptable have been able to tap for jobs or business opportunities.

People are still coming to terms with the fact that they might have to go through at least a couple of job transitions in their lifetimes and retire very late in life. Corporations and governments, are similarly adjusting policies and practices to accommodate these changes, such as introducing incentives and programmes to reskill, increasing retirement age and reviewing workplace policies to cater to older workers.

There is a real plight that young people in some situations are facing, which should not be ignored. For many, COVID-19 has created conditions of real suffering—youth who were already at-risk pre-COVID, those in disadvantaged households and youth in rural developing countries.

There are signs that their struggles will only be temporary. With state and community interventions, some youth are navigating this crisis. Others have used this opportunity to organise community COVID responses or start small businesses to overcome challenges presented by COVID-19. They often find smart ways to use technology to do so.

Many in middle-income economies, previously heavily reliant on single sectors such as tourism, could see youthful energy pivoting to new areas of growth, or channelling their energies to meaningful social causes.

Calm Collective Asia, founded by three young people, was set up in the throes of lockdown in Singapore when mental health services had been disrupted, and the isolation and anxiety from COVID-19 had come down harder on many already suffering from mental health issues. The initiative brings together mental health professionals, advocates, and people who may need

help or simply seek a supportive community. While the physical interactions that come with traditional professional treatment are important, many nevertheless found their online conversations meaningful. Some even thought they were more accessible since they could seek help even without leaving the house. It is also hoped that discussing mental health issues more openly would destigmatise mental health and create a more supportive society.

Elsewhere, young business leaders have been quick to adapt. 87 per cent of youth-led enterprises in the Asia-Pacific changed or adapted their business strategies to suit the pandemic. Many young people, including those still in school, spent COVID-19 starting small businesses. Using e-commerce tools like Shopify or social media platforms like TikTok, many have learnt to do business from reviewing and promoting products, creating media such as advertisements, illustrations, videos, as well as creating new products such as crafts for sale on Etsy. A study in the UK has shown a surge in young people setting up online businesses during COVID-19. It is anticipated that the average age of a UK entrepreneur will decrease—an interesting COVID-19 legacy.

These are forms of alternative learning that could more than make up for the temporary loss of a formal learning environment. Life cycles need not involve “front loading” formal education in a chunk of time spent in a school. Learning should happen during the course of one’s life, and not just in an early part of it. Learning should also take on many different forms.

It is exciting to consider what future life cycles will look like. Emerging from COVID-19, many of us have become more introspective, taken the time to switch jobs, pick up new skills. Combined with youthful energy and innovation, we could re-write cycle milestones today, ahead of the demographic and technological forces that will befall us.

### GEN Z COULD SAVE US ALL

Early research into Gen Z has revealed surprising characteristics. According to fledgling research, this group allegedly prefers to socialise online, rather than head out to a party or club, and drink less alcohol. They are the most educated

among generations. Many are also part of a growing “hyper woke” culture, and are themselves the most ethnically diverse of generations. Many care about being politically savvy and actively participate in civic discourse. They are more sensitive and thoughtful about mental wellness. They value family, and they view progressive societal changes positively. They are fiercely passionate about sustainability and climate change.

If these characteristics are true, Gen Z, who prefer to spend their Friday evenings on their phones with friends over virtual drinks, may well best endure prolonged periods of social distancing. Their “wokeness” could help them navigate the new divides created by COVID-19. Emerging from the pandemic, their passion for the environment could see a birth of new businesses and community initiatives that could take us on a greener road towards recovery.

Gen Z has experienced significant turbulence in their developmental years. These include world events such as the Asian Financial Crisis, 9/11 and its far-reaching effects, and SARS. Climate Change has manifested with increasing frequency during their lifetimes—extreme weather events and the spread of zoonotic diseases like COVID-19 are just some examples. Having grown up with a digital mirror world, Gen Z may have the best mastery of it, and the greatest chance of safely navigating its treacherous waters. They have probably experienced tragedies of their own in the digital realm. They may have been bullied, know of someone close who has struggled with mental health impacts of bullying or digital isolation. Many cope with these experiences alone, or with online communities. Yet as the melding of physical and digital worlds confounds the rest of us, Gen Z could help us navigate this “digireal” with their unique wisdom.

If there was any generation that could survive COVID-19, it would be Gen Z. They could be the most resilient of us all, and they, together with other pandemic survivors, could reimagine life cycles and help us “lost” generations find our way.

# SPOTLIGHT ISSUES

# Caring for the Vulnerable in a Crisis

By Jeanette Kwek



The first of CSF's SPOTLIGHT series highlighted the vulnerable groups of COVID-19, many of whom may be rendered "suddenly" vulnerable because of the characteristics of the pandemic. Less obvious groups, such as those with higher incomes, could be rendered vulnerable due to industry disruptions, while many with mental health issues or those experiencing domestic violence, could require more urgent help than others.

While governments are working hard to manage the immediate impact of the COVID-19 pandemic, these efforts may inadvertently exacerbate existing vulnerabilities, or create new ones. For instance, as jurisdictions put social isolation measures in place, domestic violence is on the rise. The UN has described this as a "shadow pandemic", and asked governments to include the prevention and redress of violence against women in their national response plans. In Singapore, family violence rose after the "circuit breaker" (local parlance for Singapore's social isolation measures) started in early April. 476 reports were filed from 7 Apr to 6 May 2020, a 22 per cent increase over the monthly average before the circuit breaker.

This rise in family violence may be rooted in several causes. First, the sense that their lives are out of control due to the pandemic may trigger some abusers to lash out against victims, in a bid to regain a sense of control and power over their situation. Second, social isolation separates victims from potential support systems. Lockdowns have allowed abusers to more easily isolate their victims, and prevent them from seeking help. Those at risk—spouses, children, parents—no longer have even the brief reprieve of school or work. Fear that they might expose their loved ones to the virus might also keep victims from turning to support systems during this period. Finally, economic uncertainty may make it more difficult for victims to leave abusive relationships at this time. With an economic recession looming, it would be more difficult for victims to establish financial

independence, or find new living arrangements. To compound the problem, economic hardship tends to be a trigger for more violence, especially in relationships that were already abusive.

Technology may help mediate the situation. In the two-week period after the Netherlands instituted social isolation measures in mid-March 2020, a Dutch help-line saw a surge in the number of children asking for advice on community forums and using its online chat tool to talk to experts. Courts in New York started issuing protection orders virtually, removing the need for victims to physically go to court to obtain protection from an abuser. New York City's Mount Sinai Hospital is doing Zoom therapy sessions. However, these digital innovations struggle with balancing the rights of the accused and the accuser. Judgements and monitoring have to be done over a video link, where outsiders can only see what the individual chooses to reveal. In other places, new safe spaces and code words provide new sources of protection to victims. For example, pharmacies and supermarkets in some European states have become safe spaces where victims can use code words to signal a request for protection. These retailers remained open through lockdowns, as shopping for essential goods was one of the few accepted reasons for leaving home.

Family violence is not the only problem. We may see rising levels of anxiety as the pandemic drags on. COVID-19 has heightened people's awareness of uncertainty in their environment.

Objects that were previously benign, such as lift buttons, have become potentially harmful. Individuals feel they have little control over their environment and infrastructure, which is often designed with connection and not COVID in mind. They also experience anxiety over their family members' health, particularly if they have relatives who are in the high-risk group.

With additional anxiety-related stress and the pressure of social isolation, people with pre-existing mental health conditions may be particularly at risk during this period. Others who may be negatively affected might be extroverted individuals whose social lives and leisure activities usually revolve around physical, face-to-face interactions. For seniors, lack of social connection and brain stimulation is associated with higher risks of health problems such as heart disease, dementia, and even premature death.

Once again, technology may be mediating some of these challenges. In the US, when digital platforms asked the elderly what they needed during the lockdown, seniors overwhelmingly asked for ways to stay engaged with the outside world. Web platform chats and "parties" allowed for continued (social) interaction, and may also strengthen emotional connections across extended families. New social infrastructure has emerged online. Bake- and cook-alongs on social media replace gatherings in communal kitchens, but also create new communities with shared interests. A memoir-writing club connected senior storytellers with millennials willing to record them, while other groups linked young and old for digital check-ins, which may seed ties that last beyond the pandemic.

Finally, the pandemic could be causing new vulnerabilities, or at least accelerating incipient fragility. For instance, those who are digitally illiterate or "analogue by choice", particularly if they live alone, may find it difficult to manage prolonged lockdowns. For these individuals, especially the elderly, accomplishing daily tasks such as buying groceries may be challenging. Even as the digital generation becomes more proficient with online meetings and comfortable with online grocery shopping, there remain those who struggle with topping up pre-paid SIM cards for access to the outside world.

Individuals whose incomes are highly dependent on sustained social interaction, or based on variable components, could become suddenly vulnerable. Largely invisible prior to the crisis, these "formerly rich, suddenly poor" individuals' incomes are dependent on commissions, hourly or performance-based rates. Tuition teachers, physiotherapists, real estate and insurance agents are among those who cannot work from home effectively, as their jobs require contact with customers to close sales or collaborate on the product. Yet they may not be eligible for existing relief schemes and social support.

As we continue to work on getting through and recovering from this pandemic, it is worthwhile considering who else might need protection and a helping hand.

# Bio-surveillance in the Era of COVID-19

By Tse Hao Guang



Soon after the pandemic hit, it became clear that a technological solution was necessary to keep up with the load of contact tracing, in order to manage the public health situation. Solutions considered included mobile bluetooth tokens, mobile phones and special IDs for different districts. There was significant concern about feasibility, data protection and privacy. In this issue, CSF hoped to cut through the fog of ongoing debate and highlight unintended consequences and higher-order issues of track-and-trace technologies.

Governments and other organisations are using technological solutions to safely resume economic and social activity amidst the COVID-19 pandemic. Some solutions, such as track-and-trace technologies to complement manual contact tracing, have been criticised for having limited utility in controlling COVID-19 transmission. Nonetheless, there are signs that bio-surveillance regimes—including immunity certification and the use of contactless biometric authentication like facial and iris recognition—are increasingly being considered as additional pandemic management measures. Beyond the usual trade-offs between safety and privacy, bio-surveillance may have surprising implications both for organisations using them, as well as people subject to them. Bio-surveillance is one area that governments should examine closely now, in order to better understand future trends to come.

## THE UNFULFILLED PROMISE OF DIGITAL CONTACT TRACING

Governments have turned to tech-assisted contact tracing, with mixed results. Some such methods rely on Bluetooth technology to track physical proximity between smartphones, alerting those whose phones have been in close contact with phones of confirmed COVID-19 cases. Others rely on some combination of Global Positioning System (GPS) data; blacklists of viral hotspots; user-provided personal, health (i.e. symptoms) and travel information; or existing government-held data on citizens. Some methods

rely on centralised data storage; others use a decentralised system where data is stored only on users' devices. Some solutions are dependent on users downloading an app (voluntarily or mandatorily); others mandate check-in to venues.

Many of these solutions are proving insufficient. Governments of countries using Bluetooth mobile apps, including Germany and Switzerland, are unable to find out how many people have actually been warned by the apps. Several other initiatives, such as in Japan and the UK, have been hampered by bugs and/or delays. To complement its TraceTogether app, the Singapore government has instituted the SafeEntry “check-in” system and created physical, “always-on” Bluetooth tokens to address smartphone battery, app compatibility and other usability issues.

## TOWARDS MORE EFFECTIVE BIO-SURVEILLANCE

The trend towards bio-surveillance had already been underway pre-COVID-19 with the adoption of biometric e-passports and the EU's iBorderCtrl initiative, which would require incoming travellers to undergo lie-detection tests that analyse “micro-gestures” such as subtle nonverbal facial and bodily cues. The benefits of authenticating bodies seem clear: it appears much more difficult to evade bio-surveillance or forge biometric identification, even though low-tech methods to get around bio-surveillance are already in use.

With COVID-19, the importance of bio-security has become even more widely accepted.

An example of an accelerated bio-surveillance regime is China's use of Health Quick Response (QR) codes. In February 2020, when China was beginning to see exponential increases in COVID-19 cases, the city of Hangzhou tapped on Chinese digital giants to create the Health QR code system. It combines personal and health data provided by users with data collected and stored by the government; relies on AI to determine blacklists of “high-risk areas”; stores data centrally; and assigns users safety statuses that determine access to venues. The system is not fully transparent; it is not clear to the users precisely how their statuses are determined. Chinese citizens have largely accepted Health QR codes and other bio-surveillance technology such as AI fever-detection systems, backed by the belief that these measures have helped the country to quickly contain the pandemic.

In a similar manner, digital immunity passports, or a presentable proof of immunity to COVID-19, have been suggested as a means to safely restart international travel and return to work. This is despite the World Health Organisation's warning that there is no evidence that those who have recovered from COVID-19 are protected from a second infection. Reports are emerging of “reinfected” individuals in Hong Kong, Belgium, the Netherlands and the US. Regardless, proposals for immunity passports have been made in the UK, Germany, Indonesia, Italy, Israel, Colombia, Argentina and the US, and companies like contactless hotel booking platform Sidehide have announced partnerships to deliver booking systems making use of such passports. Ahead of the curve, Estonian NGO Back to Work is already testing smartphone-based digital immunity passports in partnership with local companies.

COVID-19 is creating even more demand for contactless identification and verification technologies. The global facial recognition market is expected to grow from US\$3.8 billion in 2020 to US\$4.5 billion by 2021, and the global iris recognition market from US\$2.3 billion in 2019 to US\$4.4 billion by 2024; both driven by increasing government and corporate interest. Ninety-eight countries already use facial recognition, and both facial and iris recognition technology is used to

secure mass-market smartphones. Closer to home, Singapore's Universal Studios now requires visitors to pass through facial recognition scanners to enter the park, in order to provide contactless and seamless verification of tickets and ticketholders. Changi Airport also recently introduced facial and iris recognition to replace fingerprint scanning for immigration clearance, utilising the enrolment of such data with the Immigration and Checkpoints Authority since 2017.

## CONSIDERING THE UNINTENDED IMPLICATIONS OF BIO-SURVEILLANCE

Bio-surveillance regimes are prone to mission creep, persisting and increasing their reach even after the epidemiological threat subsides. For example, Hangzhou proposed to expand Health QR Code use to rate citizens on exercise, eating, drinking and smoking habits. This provoked widespread criticism on Weibo, adding to lingering concerns that the Chinese government would use QR codes and facial recognition technology as a means of long-term social control.

Bio-surveillance could also lead to unnecessary restrictions on people in public spaces. The Shin Bet augmented contact tracing in Israel with counterterrorism methods; however, these methods sent thousands of healthy Israelis into quarantine. Smartphone-based solutions could also lead to the physical isolation of those without access to them such as the elderly, rural populations and the low-income. One Chinese man reportedly walked 600 miles to relatives in another province as he had no smartphone and was not allowed to use public transport. Another woke up at home after a night out to find his phone and ID card stolen; he could not pay for new ID because he used mobile payments. He did not leave his apartment until a new phone ordered by his friend arrived. Of course, physical tokens can be stolen or lost, too.

Bio-surveillance can provoke non-compliance and malicious or perverse behaviour. In India, a programmer successfully hacked the Aarogya Setu tracing app so that he always appeared safe; other workarounds include flashing screenshots of the app's “green badge” to authorities. Pakistan's Patient Zero became a pariah after his name, photograph and home address were leaked on social media. A suite of low-cost hacks has been developed to

bypass facial recognition, such as 3D-printed face masks, makeup, infrared light, and printing complex patterns on clothing. In some cases, hackers can fool facial recognition software into recognising a completely different person. Iris recognition hacks involving photos and contact lenses have also been successful. Immunity passports, if implemented, could lead to perverse outcomes; a *Daily Mail* poll found that 19 per cent of respondents would consider deliberately infecting themselves if such passports were introduced.

Another aspect of bio-surveillance relates to the nature of biometric and health data that such regimes generate and use. Such data is particularly vulnerable to identity theft, as it is in most cases impossible to replace, unlike credit card data or even one's address. A global consensus on the legal, policy and ethical issues surrounding the collection and handling of such data is still far off. As bio-surveillance becomes more widespread and pervasive, it is likely that such issues will come to the forefront, especially when security vulnerabilities emerge or data breaches occur. For example, facial recognition company Clearview AI's entire client list was stolen in February 2020, leading to pressure on the company to stop collecting publicly available images of faces online.

#### GOVERNMENTS SHOULD PREPARE FOR THE "BIODIGITAL CONVERGENCE"

We are increasingly experiencing a "bio-digital convergence", where biological and digital systems interpenetrate to change the ways we live, work and even define what is natural or human. The rise of bio-surveillance, accelerated by COVID-19, is undoubtedly one undercurrent of this driving force. The need to ensure safety and order through more direct and fine-grained monitoring of human bodies has led to these new methods of sensemaking. Technological advances will not only improve them, but also build upon them to generate further novel applications. In order to understand what a biodigitally converged world might look like, it is crucial for governments to look at the unintended implications of bio-surveillance now. Developing ethical, legal and policy frameworks in response could equip countries to face this future with more confidence.

## "Agile" Manufacturing and Frugal Innovation: Resilience in Light of Supply Chain Disruptions



By Gurubaran Subramaniam and Calissa Man

Supply chain resilience is critical for any country in a pandemic, and is especially so for Singapore. COVID-19 had laid bare the vulnerabilities in the interconnectedness of global supply chains, and demonstrated the limits of subsequent attempts at reshoring production. Many were forced to embrace agile manufacturing and frugal innovation—this issue highlighted some such signals and practices that could inspire the building of a more resilient and innovative manufacturing ecosystem in Singapore.

Global supply chains have come under significant strain. Governments have sought to mitigate this by facilitating the reshoring of production of essential goods or ramping up local production of those goods. States are stockpiling critical supplies and materials; some even adopting aggressive tactics such as implementing export restrictions on therapeutics and medical equipment, and hijacking shipments at transit hubs. The scarcity of medical supplies and their concentration in the hands of a few countries have given rise to new power dynamics, creating opportunities for "mask" or "test-kit diplomacy".

To mitigate supply chain disruptions, some governments and communities adopted innovative approaches. It is useful to examine these approaches and their enabling factors which can help ramp up quick production in times of crisis. An enabling environment could also better nurture a culture of innovation for longer-term strategic advantage.

#### "AGILE" MANUFACTURING, ENABLED BY NETWORKS AND ADJACENCIES IN CAPABILITY AND RESOURCES

Many non-medical companies turned to "agile" manufacturing to mitigate supply chain disruptions. This refers to production lines being repurposed to mass-produce critical items.

The Taiwanese government issued a directive to ramp up the domestic production of masks, having sourced 90 per cent of its supply of surgical masks from overseas at the start of 2020. Through a call for volunteers to its members, the Taiwan Machine Tool & Accessory Builders' Association (TMBA) formed a national team in just five days. The team comprised around 140 professionals from companies in the machinery sector, the machine tool industry, as well as industrial research institutes. It repurposed manufacturing machinery to create 60 production lines for surgical mask machines in 25 days, which contributed to increasing Taiwan's domestic production of masks. The quick response was enabled by close networks of professionals with shared expertise, even across different industries. Some have attributed the success to the positive relationship between workers and government, notably the Ministry of Economic Affairs. Positioned in the press as a patriotic endeavour, rival firms were motivated to collaborate for the sake of public good. In Singapore, engineering firm Singapore Technologies (ST) Engineering and gaming company Razer, in collaboration with the government, converted existing manufacturing lines to begin producing surgical masks domestically when a foreign supplier was unable to fulfil contractual obligations to supply the masks.

An operation of similar scale and speed was undertaken by luxury conglomerate LVMH.

It repurposed its perfume and cosmetics factories to produce hand sanitiser in just 72 hours to meet the French government's call to industry to help fill gaps of key medical supplies as France went into lockdown. LVMH donated 12 tonnes of hand sanitiser to the *Assistance Publique—Hôpitaux de Paris* (APHP)—the group of 39 public hospitals in Paris—in a week.

Where corporate and community capacities and capabilities were unable to fill shortages, a top-down approach was necessary. This was met, however, with uneven success. One reason for failure could be strict regulatory compliance requirements and the time taken to process tests and approvals. The UK, for instance, launched a ventilator challenge, calling on industry to produce 30,000 ventilators in two weeks. Despite the best efforts by manufacturers in adjacent industries, including Dyson, to design and build a viable prototype, the ventilator challenge failed to produce a device that could meet the clinical requirements for treating COVID-19 patients. Furthermore, regulatory approval for clinical use was contingent on not just the design of the product, but also the servicing and usage of the product, and after-treatment care.

These success stories show that it is relatively easier to pivot to manufacture simple products such as masks and hand sanitisers, but more challenging for complicated products with longer value chains which require deeper knowledge bases and are highly regulated. Therefore, governments would have to consider which products might be more suitable for "agile" manufacturing in their own contexts, considering overall cost-effectiveness and other limitations such as land requirements and manpower constraints. For complicated products, it would be useful for governments to build a deeper understanding of existing capabilities and how their ecosystems could be augmented with new plants or stockpiles, work more closely with industry in forward planning, and consider flexible approaches to regulation in times of crisis to mitigate shortages. It would also be worthwhile to explore the role educational and research institutes could play in such an effort.

Other ways to promote "agile" manufacturing include the sharing of proprietary information. US company Medtronic shared the full design

specifications, production manuals, and design documents for its Puritan Bennett (PB) 560 portable ventilator to allow other companies to manufacture it. However, it remains to be seen if other corporations will follow Medtronic's example in sharing intellectual property in support of national imperatives, potentially losing out in the longer-term.

### FRUGAL INNOVATION AS A STRATEGIC ADVANTAGE AMIDST FISCAL AND RESOURCE CONSTRAINTS

Amid severe fiscal constraints, some countries have adopted frugal innovation to manage during the crisis.

India adopted several low-tech frugal solutions in the private and public sectors. The Aryan Paper Group created cheap, quick-assembly cardboard beds that cost as low as 900 rupees (S\$16). A prototype was developed in a week, before its successful deployment in public hospitals nationwide.

The Indian Navy also developed an air pod for the safe transportation of COVID-19 patients, which cost nearly 100 times less than imported pods. The state of Maharashtra stamped individuals who were given home quarantine orders with indelible ink normally used to mark voters in elections, so they would be noticeable to others if they left their homes during the quarantine period. The "*Prana-vayu*", a portable closed-loop ventilator developed by an Indian university, IIT-Roorkee, cost 25,000 rupees (S\$460) to manufacture, while the "*Rudhaar*", a ventilator prototype developed by a first-year student at IIT Bombay, cost 10,000 rupees (S\$180). These were much more affordable compared to imported ventilators that cost US\$40,000 or more each.

India's spirit of frugal innovation is rooted in the culture of *jugaad*, a Hindi word that refers to an improvised fix or clever solution born in adversity—using whatever is available and doing more with limited resources through experimentation and improvisation. *Jugaad* has been credited as the foundation for the rise of India's global industries of pharmaceuticals and technology. In both industries, Indian companies with far fewer resources than their foreign competitors came up with cheaper and more effective ways of doing things, which ended up being a competitive

advantage. India's successes with frugal innovation during the COVID-19 pandemic has also been attributed to its version of the "triple helix" model of innovation, integrating efforts across universities, start-ups, and the government. This involves mapping relevant technologies developed by start-ups as well as crowdsourcing platforms to aggregate ideas and solutions from various domains of expertise. Acknowledging the need to better nurture innovation from a young age, the government has set up over 8,000 Atal Tinkering Laboratories in schools nation-wide to encourage children to tinker in electronics, robotics, AI and 3D printing.

Outside of the pandemic, better understanding frugal innovation is also key to avoid being blindsided by disruptive inventions across a myriad of sectors. The impact of cheap, low-tech offensive moves has been best exemplified in the security sector, having caught many countries by surprise in recent times. The still-effective "propaganda balloons" flying between North and South Korea, and the use of "fire kites" across the Gaza-Israel border are just some examples of cheap innovations with extremely costly impact. Low-tech weapons such as knives and moving vehicles have also been used by terrorists to wreak havoc in cities, catching authorities by surprise.

Against the backdrop of fiscal and resource constraints, frugal innovation capabilities could be a strategic asset for governments. Talent from countries with a strong ground-up culture for innovation could be more sought-after; systems that encourage such capabilities could benefit in the longer run as they capitalise on frugal innovation to tackle national challenges. Understanding the factors that underpin frugal innovation could also prevent countries from being blindsided by cheap, high-impact inventions.

### GROUND-UP ACTION TO COMPLEMENT LARGE-SCALE INNOVATION AND HELP BUILD FRUGAL INNOVATION MINDSET

Hand-sewn face masks, non-contact thermometers and 3D printed face shields are among the supplies that were made by maker communities around the world. Online communities on Materialise, Facebook, Formlabs and Reddit generously shared open-source designs and expertise

for free. Such online platforms provided open-source design templates, while makers could offer feedback and improvements for prototypes developed by others.

3D printing hobbyists even offered free 3D printing services for components such as oxygen valves through Formlabs and Google Sheets. These platforms and communities proved efficient at improving designs quickly. For instance, the design of the popular Prusa face shield, developed by Czech 3D printing company Prusa Research, was revised thrice, cutting its printing time in half. Almost 200,000 of these face shields were printed and donated to the medical community in the Czech Republic.

These success stories suggest that a community-centred innovation strategy could complement government investments in high-tech R&D. Especially as countries around the world operate in an increasingly tight fiscal environment, access to possible cheap, low-tech solutions that could deliver high impact could become increasingly important.

Community-centred innovation such as the maker community could also serve as new grounds for civic action and community cohesion. It could be worthwhile for governments to better support these groups to promote civic involvement, social cohesion and national identity building. Additionally, encouraging a do-it-yourself ethos, such as helping people embrace the use of accessible, low-tech tools and inexpensive materials, may help build a mindset and culture of frugal innovation.

# Relationships in 'Perspex'tive: Connections in the time of Corona

By Angel Chew

Social distancing had a great impact on how we connected with each other. At the time of writing, it was unclear how long social distancing measures would continue for. This issue sought to imagine what the longer term impacts of prolonged social distancing might have on relationship-building.

At the height of the COVID-19 pandemic, a third of the world's population was under some form of lockdown. Some have gone through recurring lockdowns; others have yet to emerge.

Despite curfews and the closure of bars and restaurants, people have still found creative ways to connect with each other while being cooped up at home. In countries where infection numbers are falling and there is an urgency to restart the economy, lockdown measures have been relaxed. But even as social and economic activity restart, active management of the spread of COVID-19 is necessary through safe-distancing measures. Some of these measures are conspicuous—from perspex partitions to check-in stations at every establishment—and will remain for as long as the virus remains, and as long as most people remain unvaccinated.

Moving out of lockdown, it is uncertain if people will keep up with virtual ways of maintaining relationships, or if those leaving the safety of their homes will limit their interactions only to trusted social bubbles. While it is still too early to tell, it is useful to understand potential new ways by which relationships could be forged or maintained in a period of protracted safe distancing.

## RELATIONSHIPS UNDER STRESS

At the height of lockdown, prolonged close proximity proved to be too much for some couples. Arguments over trivial matters quickly escalate into full-blown conflicts. In Japan, the term “corona

divorce” was trending on Japanese social media sites as unhappy couples aired their grievances about being confined together. In China, cities such as Xi'an, Shijiazhuang and Shanghai saw a surge in divorce applications after lockdown—a phenomenon dubbed by the Chinese public as the post-pandemic “divorce with a vengeance”. Still more alarming are reports of rising incidence of domestic violence as victims are confined with their abusers, without the temporary reprieve of school or work.

## UNINTENDED BENEFITS OF LOCKDOWN FOR SOME OTHERS

But the lockdown also meant that parents who used to work long hours could spend more time with their children. Families and partners learnt to live with each other better, connect more deeply, and provide emotional support to one another throughout the pandemic. According to family psychologist Brad Sachs, there is a “shared sense of vulnerability” with the pandemic, and because of this, families are developing richer connections.

The enforced solitude of lockdowns also provided many with moments of reflection, some taking the time to consider mortality and economic fears, and to re-evaluate and recalibrate priorities in life. Research conducted by the Australian Institute for Family Studies (AIFS), showed that lockdown reinforced the “essentialness” of kin and close connections among families and close friends in providing both financial and emotional support. Some estranged families

even reconnected during the pandemic—something experts say helped boost mental health and bolster resilience.

## NEW WAYS TO SEEK SUPPORT AND BUILD NEW RELATIONSHIPS

For individuals living alone, friends proved to be an important pillar of support. Sharing fears and concerns with close friends during this uncertain period can help with tackling loneliness and anxiety. Some even took to forming “quaranteams” or “germ pods”—groups of people who choose to live with one another during the pandemic. In such groups, trust and communication proved essential; each person's safety is after all at the mercy of the decisions of others. Experts point out that people coming together in such unconventional ways to tackle the challenges of lockdown is evidence of community resilience.

Many singles also continued to build new relationships online. While the use of dating apps and websites is not new, previously shrinking usage climbed in March when lockdown measures were put in place. Dating.com reported that global online dating was up 82 per cent in March; the average length of Tinder conversations increased by 25 per cent; and Bumble reported an 84 per cent surge in the number of video calls between the third and fourth weeks of March. And for Match Group, which controls over 60 per cent of the dating app market, the average revenue per user rebounded and even surpassed pre-pandemic levels according to their second quarter 2020 earnings report.

Relationship experts say these are promising signs of people choosing to slow down and extend the courtship process; it is making some people reconsider what they want out of a romantic relationship and build more meaningful connections. Nevertheless, some dating app users say that virtual dating simply saves them money and time, and they can meet multiple potential partners in one night. The benefits of prolonged online dating are still unclear, yet these practices may continue to some extent. With the quick distribution of an effective vaccine still uncertain, and the prevalence of asymptomatic transmission, cautious singles may remain anxious about seeking potential partners in an era of safe distancing.

## POST-LOCKDOWN SOCIAL BUBBLES

Just as some limited their social interactions during lockdown to “quaranteams”, others are entering post-lockdown with caution, forming “social bubbles”. These bubbles consist of small, trusted groups of people who all agree to socialise exclusively with one another without minding safe distancing measures. Outside this bubble, all other social interactions are severely limited.

Some governments even encouraged their citizens to form social bubbles when lockdown measures were being relaxed. For instance, New Zealand authorities allowed bubbles to expand beyond households to include close family and *whanau*, caregivers and even isolated people. The Canadian province of Newfoundland and Labrador adopted a “double-bubbling” approach where households are allowed to pair up with just one other household, and later allowed up to six more people to be added to existing double bubbles. Anecdotal evidence in Singapore suggests that some more cautious citizens are also forming their own social bubbles to provide a sense of safety as they resume social gatherings.

Social bubbles are proving beneficial in enabling socialising and improving mental wellbeing. They could also reduce transmission since the extent of social interaction is measured. Social bubbles could also allow some families to return to work by sharing childcare responsibilities. However, forming a social bubble among friends and family can be a prickly matter.

## NEW NORMAL FOR RELATIONSHIPS?

Widespread distribution of an effective vaccine is still some time away. We can therefore assume that safe-distancing measures will be in place for a while longer. Some of the above-mentioned behaviours such as a newfound focus on family, friends and meaningful relationships could persist post-pandemic, but so too could anxiety about meeting new people and limiting interactions with people outside one's social bubble.

Given the importance of relationships to individual, community and even national resilience, it is worthwhile considering how relationships are changing with the pandemic and if any of these changes will be permanent.



# Entertainment in Crisis

By Kenneth Poon and Liana Tang



The entertainment industry was one of the hardest hit by social distancing measures. The halting of many entertainment activities affected livelihoods and also impacted society's morale, by removing important sources of mental and emotional reprieve for many. During this time, the industry was receiving assistance in jobs support, and in pivoting to new businesses. In this issue, CSF scanned the world, to look for other ways to support businesses, and to shine a light on specific areas that may need extra assistance.

Arts and entertainment might often be considered “non-essential”, yet in times of crisis, we are reminded of just how important they are in providing comfort and hope. A source of recreation and de-stressing, the sector also provides a means by which common experiences are forged, where diversity can be recognised, and where human virtues are celebrated.

Many parts of the sector rely on in-person activity and have been hit hard in the COVID-19 crisis, with many companies forced to close due to high risk of spread and challenges in implementing safe management measures. Workers like performing artists, artist managers and crew, form a significant part of Singapore's 228,200 self-employed persons across all sectors. Many of them have no employer-based safety nets and rely exclusively on physically immersive events for income. A crowdsourced survey on the I Lost My Gig (SG) website reported that in the media, arts, design and entertainment industries, COVID-19 has to date led to more than \$30m of lost income, affecting nearly 3,000 people and 9,000 projects. Disintermediated businesses include those that cater for crowded gatherings with loud music, shouting and singing, such as nightclubs and KTV spots; mass events like concerts and major sporting events; indoor leisure facilities, such as gyms and cinemas; and arts and cultural establishments such as theatre.

As restrictions continue, underground activities to evade regulation may emerge. This

has been observed in other jurisdictions, with illegal parties and ‘speakeasies’ continuing as partygoers find illicit ways to gather. Under pandemic restrictions, sector recovery in the near future appears bleak; constraints in safe management compliance may make businesses less viable than before. Many establishments will exit the market altogether and may leave more room for unmet demand to head underground. However, innovations in service delivery and business processes, and the entry of entirely new players, can provide hope for a revival of the sector when more economic and social activities resume.

This issue provides a scan of the range of innovations across the industry to inform policy considerations on support for the entertainment sector.

## SOME ENTERTAINMENT PROVIDERS HAVE INNOVATED IN SAFE MANAGEMENT MEASURES

As some countries start to ease restrictions, authorities and organisers are figuring out how to restart mass concerts and keep fans safe.

In August 2020, German researchers held a controversial experiment involving 1,500 concertgoers to ascertain the spread of the virus depending on how patrons are managed, and the effectiveness of measures such as mask-wearing and regular spraying of disinfectant. In the same month, about 2,500 fans gathered for a socially distanced concert at an outdoor pop-up arena in

Newcastle, UK, that was fitted with 500 raised metal platforms, each able to accommodate safely-distanced groups of five.

Nightlife operators have also become creative. A Tokyo bar installed fishbowl-like acrylic screens that hang from the ceiling and envelop each patron's head and shoulders. A karaoke bar in Tokyo offered patrons the option to store personal microphones on-site. One Los Angeles-based design studio prototyped an upper-body suit and helmet with N95 particle filtration for partygoers to wear over clothing. Wearers could even drink beer from attached canisters and communicate through built-in microphone and speakers.

Nightlife venues in Europe have limited group sizes and time limits to prevent mingling and lingering, and implemented upper age limits and features like open-air dancing for better ventilation. There has even been a drive-in rave party with patrons isolated in their cars.

A craze called “social dis-dancing” has also emerged. A nightclub in the Netherlands reopened in June 2020 for patrons to dance to music and strobe lights while seated in distanced chairs, for a maximum of 30 minutes in the afternoon. Similarly, Queensland, Australia relaxed restrictions in July 2020 to allow up to 100 people into nightclubs, but patrons also had to remain seated. Patrons admitted that the chair-dancing experience was strange, but that they were still happy to have a brief taste of the atmosphere and loud music.

## THE EXTENT OF THE DAMAGE VARIES DEPENDING ON THE LIMITS OF THIS INNOVATION

Entertainment often thrives on ambience, face-to-face connections and experience immersion. This is often accompanied by high overhead costs that may have to be sustained even when they are not operating. The prolonged crisis has pushed the entertainment industry to undergo its own digital transformation.

In June 2020, Korean pop sensation BTS held the biggest pay-per-view online music event in the world, garnering more than 750,000 views from 107 countries at its peak. The virtual concert allowed fans to connect intimately with group members; viewers were able to see the

perspiration running down their cheeks and hear their heavy breathing.

But the lively atmosphere of a packed arena can be critical to performance and enjoyment, especially in sports events. Some professional athletes have even been known to resist playing in empty arenas, claiming that they feed off crowd responses like cheers and boos. The physical intensity of the event is difficult to re-create in the digital space; organisers have tried to augment the experience such as by setting up big screens in arenas showing fans tuning in ‘live’ and allowing fans to transmit virtual cheers. Still, such adjustments have left much to be desired. While some virtual experiences, as outlined in later sections, can provide temporary reprieve, it is unclear if audience demand will continue to be high as digital fatigue sets in, and valuable in-person experiences are craved.

## SOME HAVE FOUND WAYS TO EXTEND LIFELINES, CREATING NEW BUSINESSES IN THE PROCESS. IN SOME CASES, NEW PLAYERS HAVE SWOOPED IN TO PLUG THE GAPS

To keep their form relevant, performing artists have been live-streaming performances from home, “e-busking” not only to generate some revenue from donations but also as a stop-gap measure to keep support bases engaged.

Cinema—from filmmaking to film distribution—has been hard-hit. This has created the opportunity to provide a different kind of experience for movie buffs. Known for its headphone raves, party-makers Silent Disco Asia is offering home packages starting from S\$150 for private movie screenings and private dance parties. All the equipment, including headphones, high-powered projector and large screen will be delivered to one's doorstep. Disco lights and smoke machines are optional extras for the full experience.

Airlines are working around travel bans with “flights to nowhere”. EVA Air held a three-hour Hello Kitty-themed flight that made a sightseeing loop over Taiwan's coasts. China Airlines created a cabin crew flight experience for children that included a morning course and even uniforms for the sightseeing flight in the afternoon. Qantas recently announced that it is restarting its

12-hour sightseeing flights to Antarctica that take off and land in Australia.

Sporting events that already have strong market activity have adapted more easily. In some cases, there has been substantial transformation. For instance, blended elite sports and e-sports has grown in popularity—the upcoming Formula One Esports Pro Series is set to be the biggest yet, with over 237,000 racers attempting to qualify. Some big sporting events have gone entirely virtual. In April 2020, fans tuned in to watch computer-generated horses compete in the Virtual Grand National. The winner was pre-decided by an algorithm that accounted for recent form and day conditions, among other factors. July 2020 also saw the first Virtual Tour de France. Riders took part from home in all parts of the world, with bikes plugged in to the Zwift virtual cycling system. Visual graphics emulated the physical map and terrain of the route, complete with broadcast commentary.

#### **OTHERS ARE REINVENTING OR REDEFINING THEIR BUSINESSES**

Some businesses have pivoted to new revenue streams. Singapore-based club Zouk turned its lounge into an eatery and leased space to e-commerce portal Lazada for live-stream bazaars. Events and talent agency Collective Minds launched an online store to sell alcohol. Timbre expanded its food delivery islandwide.

Some nightclubs have moved entirely online; using videoconferencing and gaming tools to encourage interactivity. The Zone, a European virtual club, operates on the Zoom app and has 16 “dancefloors” in breakout rooms. Guests entering the virtual club are greeted by a bouncer, who ensures that they are properly outfitted with drinks and partywear. Club Quarantee, a bottle-service club in Europe, has held Zoom parties where guests either purchase US\$10 tickets or pay US\$80 for a private room to party with DJs and burlesque dancers. TAXX, a club in Shanghai, allows partygoers to spend real money to buy virtual gifts for performers. In a February session this year, TAXX earned US\$100,400 from 71,000 partygoers in only four hours. Club Matryoshka hosts virtual music festivals on a private Minecraft game server in Manila. The club’s founder said that the virtual format allows him to assess an

international artist’s popularity before flying them in and predicted that this will eventually become the new norm for gigs.

Other forms of virtual entertainment may well become ubiquitous. In May 2020, Apple acquired virtual reality firm NextVR as part of efforts to expand entertainment and digital services. NextVR provides virtual reality access to concerts and sporting events and heralds the promise of VR to bridge social distancing.

#### **SOME SECTORS AND CAPABILITIES MIGHT NEED MORE HELP**

As arts and entertainment businesses pivot to new adjacencies, exit the market altogether, or reinvent themselves in innovative ways to comply with safe management measures, niche capabilities may be lost without lifelines afforded to them. These include important sporting and cultural assets, and their supporting infrastructure, such as theatres and cinemas. Longer term maintenance and support will be necessary even as they explore innovation in the short-term. Beyond providing comfort and entertainment in times of stress, sporting and cultural assets also preserve a country’s culture and identity.

Many events that have greater challenges making a pivot, such as those without mass appeal, may serve important roles, such as marginalised groups. Disability sports for instance, may need more support towards digitalisation.

Beyond pivoting and helping smooth exits, might we consider if there are additional ways to support businesses to innovate within safe management boundaries?

Airline and technology sectors were some examples of new players in providing entertainment. What other adjacent industries could fill the gaps left by the exit of traditional or less viable entertainment companies?

Might we also consider if there are entities that are less mass-market that may require more support, such as niche sports like disability sports, and unique cultural assets like traditional dance troupes?

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## Home Is Where the Hub Is: Reimagining the Physical Environment

*By Gurubaran Subramaniam and Seema Gail Parkash*



Some four, five months into the pandemic, remote work had quickly become a new normal, precipitating innovation in e-learning, e-commerce, lifestyle services and even neighbourhood businesses. Homes were being redefined by COVID-19 and there were signs that many of these home-based lifestyles were here to stay. CSF wanted to highlight new ways that homes could continue to be hubs beyond the pandemic, other opportunities for spatial redesign and the possible interventions needed to cater to those for whom the home as a hub presents more challenges than others.

COVID-19 has highlighted the importance of the physical environment in shaping the ways that we live, work, learn and play—even digitally. It has also demonstrated that changing behavioural and lifestyle patterns can, in turn, redefine physical spaces. Lockdowns have precipitated the rise of the multi-functional home as the hub of daily life for many and redefined common spaces. This shifting use of physical spaces has highlighted spatial inequity and also had unintended consequences, which have implications for Singapore’s efforts to build the city and home that we want.

#### **FOR MANY, THE HOME HAS BECOME THE HUB OF DAILY LIFE— AND IT COULD REMAIN THAT WAY**

Lockdowns and restrictions on social activities have forced many people to expand the primary functions of the home to include work, education, religious worship and even recreation. Spaces within the home that had hitherto primarily served singular purposes, such as storerooms and living rooms, were repurposed to also serve as pseudo home offices for work-from-home (WFH) and classrooms for home-based learning (HBL).<sup>1</sup> Lockdowns also heralded a home workout boom with the advent of live-streamed fitness classes and a botanic boom as more people turned to houseplants to relieve stress.<sup>2</sup> Virtual socialising,

including live-streamed parties, also gained popularity, as did e-commerce for groceries and more.

The home could well remain the hub of daily life for many even though lockdowns have eased. A recent Manulife Singapore survey indicated that two out of three respondents remain wary of restarting entertainment, lifestyle and fitness activities beyond the home, choosing to limit their ventures to essential activities such as grocery shopping or home visits.<sup>3</sup>

Moreover, while schools in many countries have reopened, HBL is likely to become a permanent and regular feature of education as governments relax and tighten restrictions in response to new outbreaks.<sup>4</sup> Some amount of WFH could also be regularised for most workers in the medium to long term.<sup>5</sup> A survey found that nine in 10 employees in Singapore want to continue WFH in some capacity, citing flexibility, reduced commuting time and cost-savings as perks.<sup>6</sup> In any case, safe distancing measures mean that office spaces will be unable to accommodate as many employees as they did pre-COVID-19.<sup>7</sup> A recent KPMG survey of global business leaders found that 69 per cent of respondents planned to reduce office space in the short term and 80 per cent had accelerated digital expansion plans.<sup>8</sup> As the pandemic continues, businesses may embrace remote

work permanently for some functions given lower operating cost and other benefits, as Twitter and Square have already done.<sup>9</sup>

Demand for retail spaces could also decline in the medium to long term. COVID-19 has accelerated the adoption of omnichannel, 24/7 strategies as traditional retailers strive to remain relevant amidst new operating constraints, intense competition from e-commerce platforms and changing consumer preferences. CapitaLand, which operates Singapore's largest mall network, launched in May 2020 its e-commerce platform eCapitaMall and online food ordering platform Capita3Eats, which are not limited to its existing retailers.<sup>10</sup> Traditional retailers are also harnessing virtual and augmented reality (VR/AR) technologies to allow customers to "test" products online.<sup>11</sup> For example, cosmetics companies MAC, Estee Lauder and Sephora have launched AR try-on tools for most product ranges.<sup>12</sup> Live-streaming e-commerce—"shoppertainment" combining product demonstration and marketing with entertaining content—is also reshaping the consumer experience on platforms such as Lazada's LazLive.<sup>13</sup> If many consumers eschew a physical shopping experience or traditional retailers rethink the physical store as a showroom or events space rather than a primary point of transaction, there may be less demand for retail space in the future.<sup>14</sup> At the same time, the growth of e-commerce demands fit-for-purpose urban logistics infrastructure.

A recent mass pool party in Wuhan—with no safe distancing or face-masks—could suggest that private and public life will return to "normal" once the peak of the crisis is past.<sup>15</sup> However, China has employed mass testing and mass surveillance in pandemic containment to a degree that few other countries are willing or able to emulate, to facilitate the resumption of "normal" daily life. There are also early signals that the pandemic is already informing Chinese urban planning. Xiong'an, a new self-sufficient city near Beijing promoted by Chinese President Xi Jinping as "a new standard in the post-COVID era," will feature rooftop farms and 3D-printers that allow residents to produce resources locally, and large balconies, drone-friendly terraces and ample space for WFH.<sup>16</sup> COVID-19 is also accelerating e-commerce, cashless payments, live-streaming sales, online business relationships and new production technologies in China.<sup>17</sup>

## THE FUNCTIONS AND FORMS OF COMMON SPACES ARE ALSO IN FLUX

Many jurisdictions permitted leaving the home to exercise outdoors during lockdown, given the lower risk of COVID-19 transmission outdoors. Many in cities flocked to green spaces to escape confinement. However, poor safe distancing and overcrowding fuelled fears that such spaces could become pandemic hotspots.<sup>18</sup> Toronto and New York City painted social distancing circles on the ground in popular parks to help keep groups at least six feet apart.<sup>19</sup> Portland, Minneapolis and Calgary have temporarily stopped or limited access to vehicles on certain corridors in order to facilitate walking, biking and outdoor respite-taking with safe distancing.<sup>20</sup>

Public spaces in cities are also being repurposed to give a boost to hard-hit businesses. In Rotterdam and San Francisco, walkways, plazas and parking spaces have been converted into retail spaces. Lithuania's capital city, Vilnius, has transformed itself into an open-air café, where hundreds of restaurants and bars have been allowed to set up shop in plazas and streets to serve customers while ensuring safe distancing.<sup>21</sup>

With cross-border travel at a near standstill, large-scale social gatherings prohibited and many other activities suspended, large spaces such as airports, port terminals, convention centres, sports stadiums and ice rinks were idle. However, they have proven to be valuable assets, together with disused buildings, in alleviating the immense strain on healthcare infrastructure at the peak of the crisis, as they could be repurposed quickly into temporary medical facilities and makeshift mortuaries.<sup>22</sup> Having large, flexible common spaces in the urban tapestry as "buffers" that can be mobilised during emergencies could improve urban resilience to shocks.

With living spaces stretched thin, green spaces in greater demand, and demand for office and retail space in potential retreat in the medium to long term, it might be worthwhile for governments to fundamentally rethink the assumptions underpinning the spatial organisation of cities and urban centres, including the role of central business districts.<sup>23</sup> It would also be useful to consider how homes and neighbourhoods might be reimagined to accommodate a new live-work-learn-play

balance, as well as how resilience to future shocks could be strengthened through urban planning and design.

## SHIFTING USES OF PHYSICAL SPACES HAVE HIGHLIGHTED SPATIAL INEQUITY AND HAVE ALSO HAD UNINTENDED CONSEQUENCES

With the rise of the home-as-hub, it is becoming clearer that not all living spaces are as well-equipped for this role. Lower-income households, particularly larger households in smaller flat types, experienced acute challenges with WFH—if they were even able to do so—and HBL. Faced with space constraints, they often did not have a conducive space in the home to work or learn, not to mention space for recreational activities such as gardening or exercise to de-stress.<sup>24</sup> This was compounded by the closure of public facilities such as libraries and restrictions on the use of communal spaces in neighbourhoods during lockdowns and prohibitions on social gatherings.

Wealth-based spatial inequity also fanned foreigner-local tensions when reports surfaced that a British expatriate had paid S\$10,000 per month for three months to lease a swimming pool in Sentosa Cove—a high-end residential enclave—during Singapore's "Circuit Breaker" period, when social gatherings were prohibited and sports and recreational facilities were closed.<sup>25</sup>

There are also signs that more time spent at home engaging in all manner of activities has had negative effects on personal health and well-being, beyond the isolated and traditionally vulnerable groups. A recent survey in Singapore found that 61 per cent of workers reported feeling stressed "at work" while at home, compared with 53 per cent of COVID-19 front-line workers. More respondents in the WFH group also reported feeling stressed "at home" (51 per cent) compared to the front-liners (32 per cent). More women reported feeling stressed than men.<sup>26</sup> In addition, anecdotal evidence suggests that people who WFH are also experiencing muscular strain and overuse injuries, perhaps due to poor WFH set-ups in constrained living spaces.

The increased time spent in the home and constant contact with family members has also exacerbated domestic violence and heightened

familial tensions in some cases.<sup>27</sup> The lack of privacy, erosion of personal space and autonomy, and demands of WFH have led some Singaporean singles who live with their parents to turn to the rental market, in a break with social convention.<sup>28</sup> Co-living operators have reported strong demand, including from young Singaporeans.<sup>29</sup> If this is an early signal of a new trend, there could be wide-reaching implications for the property market, marriage and parenthood, senior support and intragenerational equality, for example.

Neighbourly disputes also increased during lockdowns, particularly in densely built-up apartment blocks, as inconsiderate and disruptive behaviour became more noticeable.<sup>30</sup> With more time spent in the home, common spaces may be utilised less, with the possible exception of green spaces.<sup>31</sup> Less common space usage reduces serendipitous encounters with neighbours, passers-by and other strangers of different ethnicities and religions, which contribute to the strengthening of social bonds. At the same time, increased demand for green spaces has also revealed or intensified latent tensions between various social groups.<sup>32</sup> Immigrants, racial minorities and migrant workers have reported being more scrutinised, policed and "targeted" when using common spaces.

It would therefore be useful for governments to better understand spatial inequity in the lived experience, and consider how spatial equity could be improved through the design, provision and management of physical spaces. It might also be worthwhile reconsidering strategies for building social infrastructure in an endemic COVID future. This would include nurturing vibrant and lively yet safe public spaces and better supporting health and wellbeing in a new era of home-as-hub.

# Sustainability and Resilience in the Wake of the Pandemic

By Lucas Loh



Early lockdowns of COVID-19 transformed urban environments drastically—people around the world experienced cleaner air, more bird song, and even the return of flora and fauna. For a moment, there was reason to be optimistic about stronger sustainability moves by states, businesses and consumers. It was unclear however if these sentiments were in direct conflict with pandemic measures, and if they would also sustain beyond the pandemic. This issue sought to highlight both the nearer term trade-offs, and longer-term commitments needed to remain on the right track towards sustainability.

The COVID-19 pandemic has been a generational shock, which has increased the salience of preparing for global, long-term threats—including the existential issues of climate change and resource resilience. Governments, businesses and communities have all made public commitments to a more sustainable and resilient post-pandemic world. However, some contend that this newfound burst of interest will be short-lived. Prioritising sustainability and long-term resilience can conflict with more immediate concerns such as supply constraints and limited resources. It is unclear whether commitments and aspirations to sustainability will endure as their costs become clearer and dearer, and as the world returns to pre-COVID work and consumption habits. It will be incumbent on voters, consumers and shareholders to lock in the pandemic's catalysing effects on sustainability and resilience, and take them forward into the post-COVID world.

## COVID AND THE ENERGY TRANSITION

Global lockdowns led to sharp drops in economic activity, energy demand and greenhouse gas emissions. In April, researchers reported a 25 per cent global drop in CO<sub>2</sub> emissions and 30 per cent in NO<sub>x</sub>; in Singapore, the Circuit Breaker reportedly

cut air pollutant levels by 24 per cent. Lockdowns also appear to have shifted the energy market in ways that favour renewables. The International Energy Agency (IEA) reports that ageing coal plants have borne the brunt of the reduction in energy demand. In contrast, renewable energy has remained largely unaffected, owing to regulations prioritising grid access for renewables and the essentially zero marginal cost of operating solar and wind plants once they are built. Utilities in North America, Europe and Australia have also reported that the shift to remote work has “flattened” the hourly energy demand curve, by distributing energy use peaks at the start and end of traditional office hours, which could lessen the intermittency disadvantages of renewable energy sources.

Without concerted action, however, these reductions may prove ephemeral. Even 2020's nadir brought emissions no lower than 2006 levels, and one study estimated that the global warming trajectory may have been lowered by just 0.01°C. One source of the global reduction in emissions was a temporary fall in land transport as people stayed home, which could reverse as people return to work, particularly if they shun public transport—as record used car sales in multiple

countries suggest. COVID-induced slowdowns and low oil prices could also lead countries to delay renewable energy transitions. With governments channelling resources to address immediate health and economic risks, projects with longer-term payoffs may be vulnerable to the inevitable fiscal hangover.

## SUSTAINABLE BUSINESSES— GREEN PROFIT, OR GREENWASHING?

Even prior to COVID-19, many businesses had pledged to integrate sustainability into their business practices. Some observers have suggested that this engagement will deepen further post-COVID. Facing much the same challenges as governments—difficulties in managing globe-spanning supply chains, the newfound importance of resilience, and ever-tightening climate constraints—many companies have reaffirmed their commitments. Some commentators have likened the pandemic to a “dress rehearsal” for climate change, warning that companies would not be forgiven for underpreparing for future crises. Cynics, however, suggest that commitments to sustainability are exercises in reputation management, reflecting a desire to look sustainable rather than truly embrace sustainability.

One industry which is acutely feeling the competing imperatives of long-term environmental sustainability and immediate commercial survival is travel and tourism, which has been particularly hard-hit by COVID-19. Industry leaders have declared that the post-pandemic normal in global travel must feature sustainability as a norm rather than a niche, but carbon emissions are concomitant with air travel. Environmentalists have proposed strict green demands on airlines in return for public assistance to weather COVID; in some countries, bailouts have required airlines to commit to adopting biofuels, or to give up lucrative domestic routes to cleaner rail services. In Singapore, SIA's initial proposals for “flights to nowhere” sparked an outcry and passionate debate. The #SaveSingaporeAirlines campaign appealed on social media for ideas as to how to support a beloved national airline and cater to a restless public, while minimising the environmental footprint. The campaign generated over 2,000 ideas, some of which (such as ground tours and dining packages) were ultimately taken up by the company.

More broadly, some in the financial sector have suggested that COVID-19 could increase the appeal of sustainable Environmental, Social and Governance (ESG) investments, and thus incentivise managing companies more sustainably. In one survey, two-thirds of Singaporean fund managers expected that COVID would accelerate the shift to ESG investments. Major global asset managers have also reported that ESG investments have outperformed the market amidst COVID, and declared sustainability to be an “equity vaccine”—an enduring source of investment alpha akin to long-accepted investment style factors like value stocks. However, others have argued that the outperformance of ESG was an artefact of excluding underperforming petroleum assets, and the sudden focus on sustainable investing was mere virtue signalling during a (potentially short-lived) period of public interest.

Regardless, even a cynical reading of sustainability as performance may reveal important underlying changes in consumer preferences that businesses will need to respond to. One McKinsey study reported that, amidst COVID, two-thirds of surveyed consumers said that sustainability and climate change had become more important in their life and consumer choices. Substantial proportions of all demographic groups said that they had decreased overall purchases, but increased purchases from local brands. The largest shifts were seen among Millennials and Gen Z, who cited sustainability as a major driver of their consumption decisions moving forward—not merely in reducing their environmental impact, but also seeking out brands that cared for the health of their employees, paid workers well, and made items of a higher quality or which were repairable. In Singapore, activists have called for ambitious green pivots in the post-COVID economic recovery; beyond suggestions for a green finance hub or adopting renewable energy, observers have proposed such ideas as blockchain-based carbon offset or solar energy trading, or regenerating mangroves to promote eco-tourism.

## SUSTAINABILITY MAY COMPETE WITH HYGIENE AND RESILIENCE

COVID-19 has also brought the ideas of resource sustainability and economic resilience to the fore. The widespread fear and panic buying of food and essential goods such as toilet paper

will not soon be forgotten, nor will the lesson that supply chains may stall and trading partners prioritise domestic needs during a crisis, however briefly. The instinct will be to stockpile or re-shore production of essential goods, including food. As Singapore accelerates its 30x30 food resilience efforts, urban farmers have called for fellow Singaporeans to contribute to both sustainability and food security by reducing the farm-to-fork distance and implementing decentralised local farming, through measures such as rooftop plots to grow vegetables for restaurants, or “foodscaping”, integrating edible plants into ornamental landscapes.

However, the desire for sustainability can also conflict with the immediate imperatives for public health and safe distancing. One area that COVID-19 has clearly had a negative impact on is recycling. The understandable bias amidst a pandemic has been to turn towards single-use products, especially in countries lucky enough not to need to reuse personal protective equipment. In land-scarce Singapore, the increase in waste generated will be an issue. One local study found that the Circuit Breaker generated 1,334 additional tonnes of plastic waste from disposable cutlery and takeout containers alone. Another source of increased waste has been medical products such as swab tests and surgical masks. Notably, some equipment is regarded as disposable by local best practice, but may not be treated as such abroad. One surgeon on a fellowship in Singapore reported a culture shock that devices such as plastic retractors were used once and disposed of, whereas they would be sterilised and reused until beyond repair in developing countries.

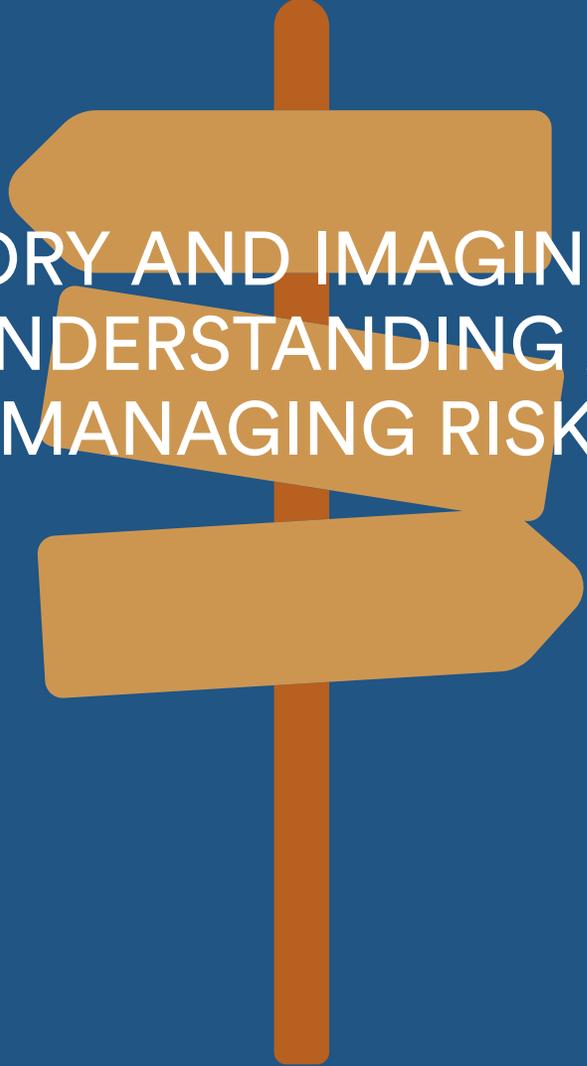
Moreover, the imperative for domestic resilience in essential goods supply may require reallocation of other scarce resources, and thereby intensify other dependencies. For example, high-tech farming could improve food security, serve as a new source of economic growth and highly-paid skilled jobs, while being more space-efficient than traditional agriculture. It is also likely to increase energy and water consumption, may exacerbate inequalities if it displaces existing farmers, and will likely require considerable fiscal support to develop locally. Resilience and sustainability may also require shifting consumer preferences. For example, shorter, cleaner and greener supply chains in food may entail changes to dietary habits—from reducing the consumption of

imported or high-carbon footprint foods, to introducing potentially less palatable sources of nutrition, like lab-grown meats or insects for protein.

#### SUSTAINABILITY AND RESILIENCE IN THE POST-PANDEMIC WORLD

Climate change, sustainability and resilience are each multi-faceted “wicked problems”, where the diversity of stakeholders and complex interdependencies preclude a single silver bullet solution. However, the importance of the task at hand, and the need to do right by future generations, behoves us to identify and embrace “no-regrets” moves that improve one area of sustainability or resilience while not adversely affecting others; while also critically examining the trade-offs and investments that will ultimately be required for broad-based, green and sustainable growth.

To understand and manage risks  
goes well beyond identifying  
what they are.



## MEMORY AND IMAGINATION IN UNDERSTANDING AND MANAGING RISK

*Adapted from a speech by Peter Ho, Senior Advisor,  
Centre for Strategic Futures at the 2020 Understanding Risk Forum  
on 2 December 2020*

## THE FEAR FACTOR

The COVID-19 pandemic belongs to a category of risk that is called “dread risk”. Professor Gerd Gigerenzer, a German psychologist who studies risk, describes dread risk as a low-probability, high-damage event. Dread risk is often used in reference to natural hazards and threats to the environment or health, such as nuclear power.

The Fukushima nuclear disaster demonstrates aspects of dread risk. The huge Tohoku earthquake in Japan generated a massive tsunami that breached the defences of the Fukushima nuclear power plant, leading to meltdowns that leaked radiation into the atmosphere. Although the earthquake and tsunami combined killed around 18,500 people, the Fukushima nuclear disaster itself produced no direct fatalities.<sup>1</sup> Instead, about 600 died as a result of evacuation procedures and stress-induced factors. But Fukushima was perceived to have the dreadful potential to kill a lot of people. It was this accident rather than the earthquake that captured the imagination and dominated the news around the world for weeks, creating widespread anxiety. For example, news that potassium iodide pills could help prevent radiation-induced thyroid cancer sparked a run on pharmacy supplies in the United States, thousands of miles away from the disaster.<sup>2</sup> More significantly, the incident led to Germany forswearing the use of nuclear power.<sup>3</sup>

Even though dread risks like the Fukushima nuclear disaster might actually cause fewer deaths than other risks that we happily live with—such as obesity, heart disease or even crossing the road—they capture the attention of the media, stoke anxiety and make people excessively fearful. That fear can change our behaviour in ways that actually increase our risk of injury or death. For example, people are now avoiding visits to hospitals because they fear catching COVID-19. According to a survey by the World Stroke Organization of a hundred countries, hospital admissions for stroke symptoms had a median decrease of 50 to 70 per cent in the first months of the pandemic, compared with the same period in 2019.<sup>4</sup>

Fear can change our behaviour in ways that actually increase our risk of injury or death.

## THE AVAILABILITY HEURISTIC

What makes a dread risk different from other risks? A key difference is the perception that a dread risk can cause many people to die at the same time. When threats are new and dramatic, such as the 9/11 attacks with their visceral images of passenger jets crashing into the Twin Towers of the World Trade Center in New York and the Pentagon in Washington DC, they create a strong emotional impact

that skews our perception of how dangerous they are. People will also misjudge the likelihood of that catastrophe recurring. This is the availability heuristic, the tendency to over-estimate the likelihood of events with greater “availability” in memory, which can be influenced by how recent the memories are, or how unusual or emotionally charged they may be. So, after a shocking event like 9/11, we will think that another terrorist attack is a more probable risk than something else, simply because it is fresh in our minds.

In an oft-cited study, Professor Gigerenzer found that in the months after 9/11, more people chose to drive rather than to fly, feeling it was safer. Passenger miles on the main US airlines plunged between 12 per cent and 20 per cent over a three month period, while road use jumped.<sup>5</sup> The change is widely believed to have been caused by worried people opting to drive rather than fly. But the reality is that travelling long distances by car is actually more dangerous than travelling the same distance by aeroplane. Gigerenzer estimated that an extra 1,600 Americans died in car accidents in the year after the 9/11 attacks—indirect victims of the tragedy.<sup>6</sup>

## COLLECTIVE RISK

Since the outbreak of the COVID-19 pandemic, we have been deluged by alarming reports in the media. For the layman, it is hard to make sense of the risk that COVID-19 poses. This is in comparison to single events like plane crashes and natural disasters, for which we have learnt to weigh the risks, and even to become inured to them. Professor David Spiegelhalter, the well-known British statistician, suggests that to meaningfully understand the risk of COVID-19, we should compare it to the risk of dying the next year—which is our annual death risk. Catching COVID-19 doubles your annual death risk, which is very low if you are young. But because our annual death risk rises exponentially from the age of ten, the COVID-19 risk factor increases significantly the older you are.<sup>7</sup>

Furthermore, even if the personal risk is low, you may spread the infection to other more vulnerable people, such as seniors and those who cannot be vaccinated due to medical reasons. That is why we need to look beyond individual risk, which actually can be low if you are young. Instead, we should think about the collective risks, which are high. This is because infectious diseases like COVID-19 spread and multiply in ways that other individual risks, like those of car crashes or heart attacks, do not.

That pandemics pose huge collective risks ought to surprise no one. Throughout history, humanity has confronted pandemics with devastating consequences. The Black Death in the 14<sup>th</sup> century is thought to have killed between 30 per cent to 60 per cent of Europe’s population. Scaled up as a percentage of the world population today, that would reach nearly four billion deaths. The Spanish Flu of 1918 to 1920 infected half a billion people and killed perhaps a tenth of them. Between one and four million people died as a result of the Hong Kong flu pandemic that lasted between 1968 and 1969.<sup>8</sup>

A novel outbreak like SARS in 2003 can subside fairly quickly. But others like COVID-19 could rapidly get out of hand and turn into a real existential threat. Although our response to such dread risks might seem like an overreaction on an individual level, it can make sense from the perspective of survival of a city, a country and even the human species. It is not unreasonable to speculate that dread risk may be an evolutionary impulse. Early man lived in small hunter-gatherer tribes. The simultaneous death of a large number of members in a tribe would have threatened its very existence—so actions that entailed that risk, however small, were especially dreaded and to be avoided.

Most people are more concerned with problems which appear to impact daily life rather than long-term problems that may affect future generations.

#### RISK AS A PSYCHOLOGICAL CONSTRUCT

All risk, and not just dread risk, is very much a psychological construct. It is the subjective judgement that people and even whole societies make about the characteristics and severity of a risk. However, most people are more concerned with problems which appear to impact daily life rather than long-term problems that may affect future generations, such as climate change. In his book *Collapse*, the American polymath, Jared Diamond, explains the process by which a major change can be accepted as normal and acceptable if it happens slowly through small, often unnoticeable, changes, not unlike the proverbial frog in boiling water. Diamond calls this *creeping normality*.<sup>9</sup> Most people have no direct experience of climate change, or do not notice its impact because the changes appear imperceptible and occur over a long period. As a result, they adopt a wait-and-see attitude, unwilling to change environmentally destructive behaviours even when experts provide detailed and clear risks caused by climate change.

#### RISK AS A SOCIAL CONSTRUCT

Risk is also a social construct. Perceptions of risk are not just held by individuals. They are also constructed by society through its institutions, cultural values, and experience. The tighter the binding of society, the more individuals are connected by feelings of belonging or solidarity. This includes attitudes to risk. The basic idea is that collectivism, putting the common good ahead of individual freedoms, may make people more conscientious about avoiding the behaviours that could cause dread risk. This is one reason why countries in Asia, where collectivism has deeper roots, or New Zealand where community ethos is strong, have seen greater success in

tackling COVID-19.<sup>10</sup> In contrast, the emphasis on individual rights and freedoms has seen people in many western countries push back when their governments require them to wear masks or stay at home.

Not surprisingly, the spirit of collectivism and the social bonds that exist within small tribes are much stronger than those among residents in larger societies. In 2004, I had the privilege of visiting Port Blair, the capital of the Andaman and Nicobar Islands, an island chain in the Indian Ocean with unique flora and fauna. Within that ecosystem is North Sentinel Island. I learnt that it is a tiny island occupied by a small Stone Age tribe that is supposed to indulge in cannibalism. The authorities, for good reason, steer clear of the island.

Not long after my visit, the 2004 Boxing Day tsunami washed through the Andamans, and swept over North Sentinel Island. An Indian friend told me that some days later, the military flew a helicopter over the island without landing—a prudent precaution against a close encounter with a hungry tribe—and discovered to their surprise that the tribe had survived the catastrophe that had killed two thousand in the Andamans.

It turns out that they were not alone. Another tribe on Little Andaman also fled to higher ground before the tsunami struck. These small tribes appear to have retained a collective memory from their ancestors of natural disasters, developed an ability to read the warning signs of an impending tsunami—perhaps the waters turning a different colour, or the birds and animals getting disturbed—and then to flee to the high point at the centre of the island. The knowledge of these warning signs seems to be incorporated into an oral tradition. Importantly, the tribal system provided the social structure to transmit these oral traditions from generation to generation.<sup>11</sup> In today's modern world, many of these traditions have either been abandoned or ignored, dismissed as either irrelevant or archaic. But they developed for a reason—to avoid dread risk—and endured for so long in memory because they serve an existential purpose. Such traditions are therefore time-tested heuristics that rely on deeply embedded societal memory in order to survive in a sometimes dangerous and uncertain world.

Traditions are time-tested heuristics that rely on deeply embedded societal memory in order to survive in a sometimes dangerous and uncertain world.

## RECENT MEMORY AND TEMPORAL PAROCHIALISM

The importance of memory in managing risk is illustrated—once again—in the Fukushima nuclear disaster. In seismically active Japan, earthquakes are a very real and significant risk to nuclear power plants. In 2007, an offshore earthquake caused a fire to break out at the world's largest nuclear power plant, Kashiwazaki-Kariwa. With this recent event fresh in mind, Japan's Nuclear and Industrial Safety Agency, or NISA, met to discuss the safety needs of each of the country's 17 nuclear power plants. In reviewing the safety guidelines for Fukushima, the panel used data from the largest earthquake recorded in the area, one that dated back to 1938. That earthquake had caused a small tsunami. As Fukushima is near the sea, it was decided to build a seawall high enough to stop a tsunami from flooding the reactor complex. The height of the seawall was determined by the tsunami of 1938.

Nevertheless, a seismologist at the NISA meeting felt that the 1938 tsunami was inadequate to serve as a basis for the Fukushima guidelines. He pointed out that there had been a much larger earthquake in the region. It had occurred more than a thousand years earlier, in 869. The tsunami it generated led to extensive flooding of the Sendai Plain. But obviously, because it happened so long ago, the data for this earthquake depended more on archaeological evidence than on the precise information available for the 2007 earthquake. In a strong manifestation of the availability heuristic, the NISA panel decided that the 869 earthquake and tsunami were simply too "historical" and therefore would not be incorporated into the model for updating the Fukushima safety guidelines. This decision to focus on a short time horizon proved to be a costly mistake. In 2011, the tsunami unleashed by the Tohoku earthquake inundated an area that corresponded very closely to the 869 tsunami.<sup>12</sup>

We often think of earthquakes in spatial terms: how far away we are from fault lines, or from the Ring of Fire, or the proximity of our homes to the sea in areas vulnerable to tsunamis. But earthquakes and tsunamis also present us with temporal challenges. Ancient earthquakes and tsunamis are hidden from us because we do not look far enough backwards into the past. Ignoring the occurrence of an earthquake that occurred more than 1000 years ago does not reflect a lack of memory. The earth is 4.5 billion years old, but we are a young species. Kathryn Schulz of *The New Yorker* elegantly explains that "the brevity of our lives breeds a kind of temporal parochialism—an ignorance of, or an indifference to, those planetary gears which turn more slowly than our own."<sup>13</sup> In contrast, the tribes of North Sentinel Island and Little Andaman preserved ancestral memory of catastrophe, reflecting a collectivist determination to avoid dread risk. Collectively and across generations, they were able to overcome the temporal parochialism and survive the Boxing Day tsunami.

"The brevity of our lives breeds a kind of temporal parochialism—an ignorance of, or an indifference to, those planetary gears which turn more slowly than our own."

— Kathryn Schulz of *The New Yorker*

## IMAGINATION AND WILFUL BLINDNESS

This is actually not a problem of information. We also have a lot of archaeological evidence of when and where ancient earthquakes occurred. Kathryn Schulz also wrote that “ we excel at imagining future scenarios, including awful ones. But such apocalyptic visions are a form of escapism, not a moral summons, and still less a plan of action. Where we stumble is in conjuring up grim futures in a way that helps us to avert them.”<sup>14</sup>

Indeed, many such grim futures, or dread risks—natural disasters, pandemics, climate change—can often be assigned probabilities. This ought to lead the authorities to take precautionary measures. But they often do not. The author Margaret Heffernan called this *wilful blindness*.<sup>15</sup>

The reasons why they do not are several. In the first place, leaders often have a hard time properly discounting the present value of events that will take place in the future. This tendency to place less emphasis on future risks and contingencies, and instead to place more weight on present costs and benefits is a common cognitive bias known as *hyperbolic discounting*. Many, if not all, governments indulge in it. One example of hyperbolic discounting at work is climate change. Governments understand the theoretical need to consider the effects of global warming on future generations. But instead of spending time worrying about a problem that will—hopefully—occur only after they leave office, they tend to place greater emphasis on the current costs of mitigation and adaptation.

The reasons why are deeply embedded in our human nature. This leads me to the *black elephant*. What is the black elephant? The black elephant is a cross between a black swan and the elephant in the room. The black elephant is a risk that is actually visible to everyone—the proverbial elephant in the room—but no one wants to deal with it, and so they pretend it is not there. When the risk actually happens, we all feign surprise and shock, behaving as if it were a black swan.

The Thai floods of 2011 were an example of a black elephant. Everyone knows that floods occur frequently during the wet season along the low-lying Chao Phraya river system. But few paid much attention to the full downside potential of the flood risk in Thailand. Before 2011, it would have taken a big leap of imagination to connect flooding in Thailand to major disruptions of global supply chains. Perhaps, floods occurred with such regularity that everyone was inured to them. So a little more rain than the historical maximum in the northern region, compounded by man-made factors such as deforestation, led to the massive floods in 2011. As a result, major industrial parks located outside Bangkok were covered by floodwaters for weeks. Production ground to a halt, and global supply chains were disrupted. The World Bank estimated the economic cost of the Thai floods at US\$46 billion.<sup>16</sup> Ironically, for Japan’s big three property casualty insurers, the Thai floods proved

even more costly than the Tohoku earthquake.

Much of our reluctance to grapple with such risks stems from an unwillingness to face the consequences of an uncertain and unpredictable future. These consequences interfere with long-held mental models—and business or self-interest—creating *cognitive dissonance*. Cognitive dissonance leads to many organisations—including governments—to underestimate risks, ignoring warning signs of impending crisis, and taking decisive action only when the crisis unfolds. This is the *mother lode* of black elephants.

How can we limit or counter the influence of such bias? Obviously, the occurrence of a crisis that radically alters our mental models is one corrective. The SARS crisis of 2003 forced the Singapore government—as well as governments in China, Taiwan, Hong Kong and Vietnam—to take more deliberate steps to prepare for future pandemics. SARS corrected our biases, making us realise that the risks and costs of a pandemic were not trivial, and increased our alertness to the onset of another pandemic. Without SARS, it is difficult to imagine that our subsequent responses to COVID-19 would have been as aggressive and proactive as they have been. Contrast these responses with the initial lack of urgency in other countries which were largely unaffected by SARS. Identification, management and communication of risk must take into account this human tendency to underestimate or overestimate risk.

Cognitive dissonance leads to many organisations—including governments—to underestimate risks.

## CONCLUSION

Memories of unpleasant or even catastrophic events drive our attitudes to risk. This is a natural defence mechanism. But memory is not perfect, and is often impaired by our cognitive biases, and by limits to our time horizons. While imagination can drive us to construct fanciful risks, our cognitive limitations such as creeping normality prevent us from translating these into proper risk assessments and then converting them into appropriate contingency plans. To understand and manage risks goes well beyond identifying what they are. It also depends on an awareness of the importance as well as limits of memory and imagination, and other psychological and social factors that shape attitudes towards risk.

# SINGAPORE 2077

By Lee Chor Pharn

Inspired by "A Full Life" (2019) by Paolo Bacigalupi

Also published in *The Birthday Book* (2021)

Gasp, throttle and wheeze  
Look out the window and see  
a century pressed into a decade  
decades pressed into years  
Fire and pandemic, bankruptcies and riots, cults and coups  
No wonder you ask:  
*Po-po*, are we there yet?

A grunt, a growl, *Po-po* replies:  
*Ah-girl*, where is this "there" you speak of?  
We took a right turn and left "there" there  
The hinges of history are blown wide open  
America's long twentieth century is ending  
China is back  
Runaway climate, emission impossible!  
And the young choose not to be born  
Who knows what the future is?  
The present is hard enough to figure out.

Your *Ma-dah* still reskilling after she lost  
shorting the sinking of Jakarta  
Your *Low-dow* works the nightshift at  
polders guarding climate refugees  
They might rack up enough points on @SmileSG  
To join us in Neo Singapore

Did you make it past the  
AI interviewer?

No, *Po-po*, I'm still  
bottom of the heap.

Mei Pin talks to *Po-po* every week. *Po-po* loves to talk about her past, when she went overseas to study and trotted around the globe on vacation. It was more affordable as there were no eye-popping airplane taxes back then. *Po-po* lives in Bukit Timah in a very pretty neighbourhood. She has her own generator, which is very useful every time the electric grid goes down when it is overstretched in record heat. Mei Pin talks to her friend Sorapip in Bangkok daily, and things there and in other Southeast Asia cities are also not good. Everyone is complaining all the time. The government says cyberattacks are also to blame for the brownouts, but since prices for energy are already so high, there is little sympathy to go around.

Mei Pin's father was retrenched from manufacturing after the great de-industrialising debacle when Singapore was slapped with EU climate sanctions. He went for four reskilling exercises and is now building polders under the Sembawang Islands.

Mei Pin tried to qualify for these well-paying and scarce jobs, but she couldn't make it past the AI interviewer. She also tried to get into another well-paying field—producing tropical pandemic vaccines at the Singapore Tropical Diseases and Hygiene Institute—but no luck so far.

Mei Pin has opted to work in "refugeetech"—the latest X-tech after the Fintech and Lawtech bubbles, to sweep the industry. Refugeetech is about maintaining a smart, decentralised information infrastructure for the millions of climate refugees, helping them settle on container ships now no longer used for trade.

These refugees are constantly linked to the mainland doing digital farmer grunt work. In exchange, they get credits to buy energy units to turn into food and water using insect farms and water membranes on their boats. Mei Pin prides herself on spotting brilliant minds among the refugees and matching them to high-value tasks on the mainland; pitiful creatures that make her feel a bit better about her daily grind.

It is time to take another serotonin shot to calm the rising mental stress of climate meltdown. The refugees, or "*fug-ees*" as they are derogatorily called, swamp many Asian capitals. ASEAN has failed in having a united approach to refugees and

Singapore groans beneath the weight of “*fug-ees*”. But Singapore is still preferable to other ASEAN member states.

Parts of the country go under water regularly, and the two-bedroom law has been passed. Anyone with more than two bedrooms is legally bound to take in displaced Singaporeans and “*fug-ees*”. *Po-po* paid off the local council to leave her alone, just like most of her well-to-do Bukit Timah neighbours.

The Ministry of the Environment and Water Resources is overstretched, but at least dengue is under control. Singapore’s neighbours are in a worse state.

Mei Pin watches in morbid fascination how Vietnam now lives under the watchful eyes of China’s Sky and River Initiative. China turned on the rain, so to speak, after four months of drought during the rice planting season. The Singapore Protocol on Geoengineering simply had no teeth.

Mei Pin and her dad speak with annoyance at *Po-po* for eating meat, flying for fun and voting for fossil energy-dependent Singapore. Her oil and gas shares paid for her prime property in Bukit Timah. Everything she did seemed so sensible at that time, and now in her 70s, she has had a good life.

Mei Pin does not speak much of her mom, who was in a hedge fund, and tried to short Jakarta but ultimately lost to Indonesia’s infrastructure boom. When the EU Hard Decarbonisation Act finally outlawed oil and gas extraction following the Great Forest Fire of Germany, the insurance industry also failed, followed by the mortgage industry and then the banks. The US dollar dived and Wall Street ground to a halt. Singapore’s financial industry emptied out, the Singapore dollar dived and a rot-like malaise fell over Singapore.

Mei Pin despised her mom who had then moved to Shanghai to start from the bottom of China’s thriving green RMB bond industry. Mei Pin’s father Wai Kheong could not take care of her anymore as he was spending more and more time out of Singapore, building polders around SE Asia. He sent her to live with *Po-po* in Bukit Timah.

By that time, she was 19 and life was a big grey zone.

Mei Pin tries to remember a time when something in her life was not underwater, on fire, or falling apart. She realises that she cannot. She tries to remember a time when she slept as peacefully as her *Po-po*. She cannot.

*Po-po* had a good life vacationing in Kyoto and attending cooking classes in New Orleans. She has lived a full life. As *Po-po* sleeps soundly despite the smoke of Sumatran forests on fire stealing into the bedroom, Mei Pin suddenly feels like strangling her.

A government e-message flashes on her standard-issue augmented reality glasses. Neo-Singapore, also known as “The Singapore Isles” in Edinburgh is finally ready to take new migrants. This negotiation started in Singapore’s golden age 20 years ago for a 200-year lease in post-Brexit independent Scotland, including a port to tap on new Arctic trade flows.

Mei Pin puts in her application, and feels for the very first time a flutter of hope after years of economic disappointment, ready to leave old Singapore, and old Singaporeans like *Po-po*, behind.

# FORESIGHT CONFERENCE 2019: SOCIETY 4.0

By Tse Hao Guang, Liana Tang and Lim Pei Shan

CSF held its fifth Foresight Conference (FC) from 25 to 26 July 2019 at the Raffles City Convention Centre in Singapore. FC is an important part of the Singapore Government’s strategic foresight effort, which is aimed at helping policymakers navigate the increasingly complex and inter-connected global operating environment. FC serves as a unique platform for the discussion of emerging strategic issues between international and local thought leaders.

FC2019 was held as part of the Singapore Foresight Week together with the International Risk Assessment and Horizon Scanning Symposium (IRAHSS), which is organised by the National Security Coordination Secretariat (NSCS).

The theme for FC2019 was *Society 4.0*, inspired by the Fourth Industrial Revolution (4IR) and Industry 4.0. While the 4IR describes a broad range of technologies that fuse physical, digital and biological worlds into “cyber-physical systems”, *Society 4.0* envisions what society could look like in the 4IR.<sup>1</sup> FC2019 explored this future through four lenses: individuals, relationships, time and values.

This is a summary of the discussions at the conference, which was held in accordance with Chatham House rule. As such, the record is only of views articulated, and does not indicate speakers nor the organisations they represented.

## SUMMARY: SOCIETY 4.0 WOULD BE A “QUANTUM SOCIETY”

Participants collectively sensed that Society 4.0 would be a “quantum society” where polarities, conflicting narratives and conflicting identities increasingly coexist. In a “quantum society”, forces would act on individuals and groups in opposing, even seemingly contradictory ways. Three of the largest of these “quantum forces” discussed were:

- a. **Empowerment and Disempowerment**
- b. **Varying Speeds and Registers of Time**
- c. **Foundational and Multiple Narratives**

Some “breadcrumbs” or suggestions on how people might cope in this disorienting environment also emerged from the discussions:

- a. **High-touch**
- b. **Synchronicity and deceleration**
- c. **Participation**

### EMPOWERMENT AND DISEMPOWERMENT

In Society 4.0, individuals would be both more and less empowered. On one hand, we lived in an era of hyper-individualism, where people were told they could be or do anything. On the other hand, when the self could no longer bear the “weight” of these expectations of empowerment, the sense of failure that resulted would cause people to turn to faith (community) or psychedelics (self-hacking) to cope. Society 4.0, therefore, was not one of atomised individuals, and it would be **impossible to look at individuals in isolation from their communities**. Conversely, social systems needed to nourish and empower individuals.

#### *Social media empowers individuals*

Social media amplified individual voices; for the first time, individuals had audiences larger than those of medieval royalty, and might even have the power of nation-states. A participant believed that this trend would only intensify with the advent of the Internet of Things and bodily implants. This empowerment of individuals had led to the **death of expertise and a move towards decentralisation**.

**Social media-amplified voices could challenge institutional authority and existing or dominant narratives**. For example, in Indonesia, Islamic knowledge used to be transmitted solely through traditional, analogue institutions. However, the rise of cyber preachers bypassing established systems disrupted this dynamic. Collective action through social media would also be increasingly feasible.

A participant linked such social media movements to the US civil rights movement, **where rage and anger were used by the less powerful to achieve positive social change**. Another participant pointed out that the problem was with malign forces weaponising and artificially amplifying anger to erode social trust. The dilemma was **how to preserve useful rage without empowering the wrong people**.

#### *Social media disempowers individuals*

A participant said that alongside individual empowerment would arise a **willingness to accept more regulation and give up privacy in order to maintain security**. If individuals had the power of nation-states, we would want to know which individuals could hurt us. A few participants suggested that forces such as the free market and individualism might weaken in the face of wicked problems.

A participant pointed out that **social media platforms (“fiefdoms”) were owned and designed by corporations (“feudal lords”) that were not accountable to the public** and controlled which voices got heard and amplified. These platforms were also controlled by people with very similar values to each other. The ubiquity of platforms gave their use the appearance of democracy, but the situation was much more feudal. Platform owners used their software as law; they could easily “de-platform” people or groups through upgrades or tweaking algorithms. Thus, it was not just individuals who were challenging the power of nation states; **platform owners were also becoming more important than national authorities**.

#### *Disembodiment technologies free people from the physical*

Disembodiment technologies such as **Virtual Reality (VR), Augmented Reality (AR), human augmentation and cybernetics were also identified as a significant driving force**. (In fact, social media was itself a virtual reality platform.) Using these technologies, human beings could “escape” from their bodies and the physical world in seemingly unprecedented ways. Advances in medical and biotechnology also ameliorated the negative effects of genetic deficiencies, illness and ageing. With these technologies, external and physical markers of the self that we had traditionally taken for granted were shifting. A participant argued that even as these physical markers changed, internal and intangible markers would not; for example, people would be increasingly identified in terms of values, roles and spiritual identities. **To be human would mean much more than one’s biology and physicality**.

Another participant pointed out that **individuals and bodies could be “altered” even by technologies we already possessed**, such as psychedelic substances, which could lead to the dissolution, redefinition and reformation of identity. (A participant noted that the closest connection to the VR experience was the experience with psychedelics.) We also had tools and options to eliminate some

genetic deficiencies, such as born deafness. People already had to decide if they were prepared to genetically modify their children.

A participant opined that governments had lost control in virtual spaces, even as they still maintained power in physical spaces. However, as the two became increasingly blurred in a “mixed reality”, **governments might risk losing control even in physical spaces.**

#### *Disembodiment technologies tether people to the physical*

Unexpectedly, **virtual worlds were making human beings more fixated on physicality and the body.** In early computer games, players typed out actions for their in-game bodies to perform. As a result, bodies were hyper-salient compared to real life where actions were instinctive. **Inequalities in the physical world were amplified in the online world.** A participant observed that, in *World of Warcraft*, gamers played the stereotypically “feminine” healer role in equal gender proportion. However, they overwhelmingly chose female in-game avatars.<sup>2</sup> A study of “attractiveness inequality” found that online dating app Tinder’s “Gini coefficient” was higher than the actual Gini coefficients of 95.1 per cent of countries in the world.<sup>3</sup> Participants discussed how **VR privileges and advantages replicated the physical world.** In the simulation game *Second Life*, players recreated real-world status symbols.<sup>4</sup> VR programme *We Are Alfred* allowed young medical students to experience the negative effects of ageing in order for them to empathise with their patients.<sup>5</sup>

A participant noted that we could connect emotionally to a place when we were physically present in that place. **AR and VR technologies could surface unseen stories of physical places** that could help us to connect to them more deeply.

#### **VARYING SPEEDS AND REGISTERS OF TIME**

**Society 4.0 would move with varying speeds and registers of time.** Participants observed that time was physically relative, but also a part of the human experience and thus also psychologically and socially relative. For example, we lived in a multipolar world operating at different speeds, and different cultures measured and valued time differently. Even within the same society, some parts accelerated (for example, technological development), while others seemed to be stagnant or slowing down (for example, governance—however, a participant noted that this might be by design as the public sector needed to be relatively stable). Even when people had more leisure time than before, they might feel that they were more harried than previous generations. Another participant said that it was the speed of meaning-generation and representation that had accelerated in the digital era. While physical reality changed much more slowly, virtual reality changed at a more rapid pace. Therefore, **we and our children would need to learn how to be “multilingual” with time**, comfortably operating in multiple registers and speeds, and potentially translating between them.

#### *Factors contributing to time relativity*

**Media, technology and our relationship to both affected our relative experience of time.** A participant said that, in the 1960s, for example, US cities were designed around “car time” or time taken to drive from one place to another. Today, “foot time” or time taken to walk from one place to another was becoming more important. Another participant mentioned the “VR time dilation effect”, where people experiencing VR reported time passing more slowly than in real life; this was similar to people who had undergone life-threatening events or played extreme sports.

**The economy and work also structured how we experienced time.** For example, a participant pointed out that the current paradigm of standardising and measuring time originated from an era of assembly-line work. However, today’s knowledge economy meant measuring time this way was not always useful; for instance, programmers could come in to work whenever they wanted to as a nine-to-five working day was not productive for them. Another participant distinguished between the “maker’s schedule” and the “manager’s schedule”, where the former performed “deep work” or work involving a high level of concentration on a single task.

“100 years is the new black.  
If I were Russian, I’d be dead”<sup>6</sup>

#### *Implications of time relativity*

**Time relativity implied time inequalities.** The rich or those in developed countries might live longer, have more leisure time, have more information about time, be more motivated to be productive with their time, do more “deep work”, and experience more “deep time”. On the other hand, the poor often took a longer time to travel to work, and tended to work at odd hours out of sync with the body’s natural clock.

#### *Perverse outcomes of acceleration and asynchronicity*

**Technology had reduced friction and increased acceleration.** A participant said that Silicon Valley mistakenly believed that removing friction (making something as quick and seamless to use as possible) should be a core design principle. While this had meant the technology it created made it easier to accelerate, it had overlooked the fact that **friction could serve a useful function**, and we were now beginning to grapple with the many perverse outcomes of too little friction and too much acceleration.

**Acceleration had led to “continuous partial attention disorder”.**<sup>7</sup> As the pace of change accelerated and our sense of time compressed, our nerves became shattered and our attention frayed. A participant added that our brains could change and become more

plastic to adapt to this, but not without costs. We had become more easily distracted and more tired out. We were thus less capable of doing “deep work”.

## “If you don’t have babies, do you become a short-term thinker?”

**We were less exposed to “deep time” even as the need to think long term was becoming more important.** “Deep time” refers to an awareness of very long cycles of time. Another participant suggested practical policies to encourage people to decelerate and experience “deep time”, including **provision for sabbaticals, parental leave, and “retreat activities”** such as meditation retreats and social media detoxes.

**Asynchronous media and rituals could fragment collective experience, leaving us with “ambient intimacy” and increasing loneliness.** Such media and rituals were consumed or performed at different times, such as Netflix or other web-streaming services in comparison to broadcast television. Media had been increasingly moving into an asynchronous mode, starting with text messaging for example. However, synchronous rituals could create a stronger sense of community, and removing synchronicity completely might be leading to a shallow or “ambient” form of intimacy.

### *Old media versus new media*

Some participants were not convinced that the internet or new media was to blame for fragmenting society. A participant said that the **internet and new media did allow for consensus building**. A second pointed out that **social media could facilitate synchronicity** through Facebook Live broadcasts, for example. A third said that **old media had done a good job of fragmentation too**. A fourth said that the problem did not seem to lie with either old or new media exclusively. Instead, there seemed to be a feedback loop where both impacted each other. Instead of pinpointing blame, the question was **what practices, tools and communities we could tap on to ameliorate negative outcomes of any media**.

### *New cycles of time in Society 4.0*

**Extended longevity would reshape lifecycles and affect how people planned their days and lives.** We might see the elderly involved in areas that used to be seen as the preserve of the young, for example defence and education. As people lived longer, there would be an increased need to plan their lives, including planning for time that was non-family and non-work related.

**We might have to rethink business and technological cycles to accommodate different kinds of technologies.** A participant wondered if long-run tech cycles were possible. Another participant

detailed the interlocking time cycles of Silicon Valley, explaining that time pressures resulted in an average tenure of two years per worker. This was not good for businesses hoping to develop green tech, as the payback period for such technologies was longer than venture capitalists were used to. Hence, Silicon Valley retreated from such businesses. We might need longer time cycles to make bigger bets.

**Existential problems would necessitate thinking in very long time cycles.** A participant questioned whether short-termist governments could survive in the long run, and if existential problems like climate change could only be addressed by long-term thinking. Another participant added that some countries, especially those with very long histories, might be able to conceive of civilizational cycles. A third participant said that only China was doing something substantial about climate change with its geoengineering plans. It managed to do this by aligning its short-term aims with its long-term ones.

“We want to lose ourselves in a story over which we have no control. But we also want to be the hero of our own stories.”

### **FOUNDATIONAL AND MULTIPLE NARRATIVES**

**In Society 4.0, foundational narratives would matter even as individuals demanded multiple narratives.** A participant argued that this contradiction was fundamental to human nature, where we yearned both to be part of a community and to be different from everyone else. The participant said that ancient oral epics fulfilled both needs. On one hand, they delivered foundational narratives with a synchronous connection between the teller’s voice and the audience’s eardrums. On the other, the teller altered the story on the fly based on audience reactions.

### *The importance and limits of foundational narratives*

**Foundational narratives embedded shared values and provided an anchor for individuals in a VUCA world.** A participant said that every nation, ethnic group, religion and profession had a foundational narrative which distinguished that particular group from every other. Such narratives were referred to as “epic poems of our existence”. The most powerful and enduring stories, therefore, were those with values that resonated strongly with their audiences. Foundational narratives were core to ourselves, and **we used these stories to encode and understand values**. Thus, shifting values and demographics could manifest in contestations over foundational narratives.

**We lived in a moment where foundational narratives were being contested worldwide.** A participant observed that in the US, the changing texture of its population meant that formerly “fringe” Americans were writing their own stories and making their voices heard, challenging the dominant narrative of the US as a white or Anglo-centric nation. Much of the conflict that the US was going through today was a battle over narrative. Another participant said that **Singapore’s foundational narrative was also being contested** by archaeological evidence and by people who challenged overly positive framings of Raffles and British colonialism. **This might mean people holding alternative values had become more powerful and/or values in general were changing.**

A participant warned that **our attraction to foundational stories could divorce us from reality**; we could not accept data as data, and needed to wrap it in story to understand it. In addition, it was **difficult for people to balance self-validation** (stories empowered you) **with disconfirmation** (other stories might conflict with yours but might be closer to truth).

*The history and future of multiple narratives*

**The single narrative was a relatively recent phenomenon; the past and the future of stories was and would be multiple or collaborative.** In the past, the most popular and influential stories were shared creations. Single stories were enabled by specific historical and technological forces. For example, the emergence of a national identity or a national narrative was enabled by mass media and the two World Wars which forced governments to impose centralised control on huge populations.

**Technology changed how stories were created and received.** For example, the shift from oral to written storytelling resulted in **stories becoming asynchronous**. Written stories freed storytellers from physical limits, but also put stories “on the record”, making them less alterable. Today, even everyday interactions on mobile phones were “on the record”. Technology had also **made stories more subjective**. For example, film made stories more complex and subjective by inventing the reaction shot, where audiences experienced stories literally through the eyes of characters. Today, Netflix gave audiences access to global stories such as Korean dramas; however, some had accused it of lowering artistic standards—as film school graduates might lament, “Netflix’s greatest competitor is sleep”.

**Global capitalism had deeply impacted what stories could be told and which ones became popular.** The invention of copyright had enabled single stories and disabled collaborative modes of storytelling. In publishing, novel length was determined by shelf space and the dimensions of shipping containers. In the modern age, the most powerful stories were owned by corporations, and we were used to using other people’s stories to understand and experience our world.

**Collaborative storytelling was becoming more commonplace again.** Despite the controlled environment of copyrighted storytelling, people demanded participation. Fanfiction was an example of this tendency that corporates had hesitated to control. Massively Multiplayer Online Roleplaying Games in which the author was the totality of players who built a story together were another example. Some platforms like Tumblr facilitated collaborative and participatory storytelling. Even in capitalistic Hollywood, there was a shift towards writer teams making multi-season TV shows and cinematic universes. A participant suggested that in a future **where automation had dramatically increased leisure time, people could instead find meaning in participatory storytelling.**

**Human beings and machines could collaborate on stories in the future.** AR and VR technology could help stories that previously only existed online “intrude” into the real world. In a potential future, novels and TV shows could become more like games with customisable narratives. A participant cited the example of East Asian web serials, which were posted on social media platforms one episode at a time. Fans would leave comments suggesting how the narrative should progress, and inputs would be incorporated into future episodes. AI could help such content creators synthesise a large number of comments quickly.

*Reconciling foundational and multiple narratives*

Several participants wondered if it was possible to strengthen foundational narratives in a hyper-individualistic and fragmented world. A participant said that the world was moving away from Plato’s idea of one essential story towards Wittgenstein’s idea that **there were many kinds of stories with “family resemblances”**. The participant wondered if Singapore could move towards that for its national story, aspiring towards “coherent heterogeneity”, where multiple stories still made a coherent whole—or perhaps **“resilient heterogeneity” would be a better goal, where contradictory stories could co-exist without affecting the resilience of the whole.**

“Our constant curation of the present into mini-memorials is us leaving a trail of breadcrumbs to help us find a way home.”

**THREE “BREADCRUMBS” TO NAVIGATE SOCIETY 4.0**

A participant used the term **“breadcrumbs”** to refer to **trivial moments memorialised on social media** by individuals. For the participant, these constant curatorial impulses were a product of a deep fear of ever-increasing acceleration threatening to rob people of a sense of self. Thus, this “slightly demented narcissism” was in fact a way for individuals to guide themselves back to a stable

sense of self. **“Breadcrumbs” could help individuals navigate a disorienting future society.** In a similar way, three categories of “breadcrumbs” emerged in discussions as navigational aids to the dilemmas raised during the conference.

#### *High-touch*

Geography, human interaction, and “heartware” would matter more than ever in an increasingly dislocated, digital and capitalistic world; the world was not flat, but rather “spiky”. Several participants spoke about the increasing importance of human interaction; one predicted the rise of **“tangibility cults”**, and another participant observed that table-top games had their best year in 2018. **“Heartware”**, or human values and emotion, would be important in a future where human value would be measured by what was not automatable via AI. Perhaps we should prioritise health over wealth and sustainability over growth, even as the free market penalises such priorities.

#### *Synchronicity and deceleration*

In a frictionless world, more would choose synchronous media and/or rituals to seek group belonging, and deceleration to encourage long-term thinking and well-being. There were existing social movements such as slow tourism, slow food and meditation retreats that encouraged people to engage in synchronous activities and decelerate from their usual pace of life. A participant predicted a further development of such movements into **“monastic communities”**, where people deliberately chose to operate on an alternative time frame for spiritual or ideological reasons. These communities might be under the radar or even offline, and **policy could support these communities** and their activities.

#### *Participation*

Participatory governance, such as citizen engagement and participatory foresight, might help multiple narratives exist in a state of **“resilient heterogeneity”** where disagreement was strength and no one story needed to “win”. **Gaming** was raised as a platform for meaningful participation, as games had a tight feedback loop and could facilitate mass synchronous participation; the dopamine rush of gaming could help align people to positive outcomes and aid in crowdsourced problem-solving. If AR could be implemented on a city-wide scale, Live-Action Role Playing games could also be another such platform. A participant predicted that “games would master social before social media masters gaming”. However, technological solutions alone would not suffice—**“emotional courage”** was needed in any collective conversation about sensitive or difficult issues. Some wondered: might increasing citizen participation make governments more **populist** and unable to make unpopular but correct and necessary decisions?

## LOOKING AHEAD

Over the two days of FC2019, divergent perspectives enabled surprising and profound insights to emerge around the possible shapes and trajectories of Society 4.0. At the Centre for Strategic Futures, these insights have informed further projects on emerging issues.

If future societies will be rife with difficult trade-offs and “quantum” tensions, how should individuals and organisations adjust today? Might these challenges in fact already be operating in current societies? We hope these insights will provoke you to re-examine the world and its futures.

There are new players that each civilisation-stack needs to reckon with.

## BEYOND WESTPHALIA

By Lee Chor Pharn

### WHAT COMES AFTER WESTPHALIA?

The nation-state rose from the unique path Western Europe took after the Thirty Years War ended in 1648. This defined a particular notion of national sovereignty that then geographically spread from the peninsula of Europe through colonialism to reshape the world. The alternative to nation-states are theocracies, empires, tribes bound by blood, race, ideology, religion wrapped up in the peculiarities of geography. After three and a half centuries of adapting to the West, these instincts are re-establishing themselves in the old civilisations of China, India, Russia and the Islamic world, pushing back against the universalist logic of the West.

This is not a reversion to some fantasy in the computer game *Civilisations*, or a retreat into fragmented kingdoms of overlapping mandalas. To borrow an analogy from computer science, we already see the emergence of three major **civilisation-stacks** emerging in Europe, the USA and China, with a slightly smaller one in India. Unlike the past, however, each civilisation-stack must remain connected with the others, the world remains globalised and increasingly administrative.

And there are new players that each civilisation-stack needs to reckon with.

The first is **Nature**, as the ongoing pandemic has laid out with clarity. Nature has been increasingly de-sacralised since the scientific revolution, and treated as a passive-something-out-there that one could blithely take resources from, or add to a corporate balance sheet without consequences. That period is plainly over as Nature is striking back.

This is a sharp change in how we have seen Nature in recent years, which is now mainly through the lens of climate change, where human activity and technological progress was the problem. One popular solution is to reduce the overall human footprint through degrowth models or decentralised, downscaled living. Instead, the pandemic has proven Nature to be dangerous, and it is a small step to Nature needing to be tamed again through geo-engineering, terra-forming the skies and land, and re-designing viruses and other life forms.

The second is encapsulated in an unfortunate, ugly neologism—**Phygital**—where software that has been eating the world for the past decade has now eaten the public and birthed gamecults and new religions like QAnon. For now, the public is made of people, but soon it will include synthetic beings, human-machine hybrids, robots and algorithms with agency.

The Promethean era separated human life from the animal kingdom with the technology of fire. This was followed by a long interregnum and then the First Axial Age, where humans in the Hellenistic, Abrahamic, Indic and Sinic worlds explored fundamental

## What is a good life for a new type of intelligence that may be immortal?

questions of what it meant to be human. This exploration laid the foundations of civilisations. With the technologies of AI and CRISPR, we are already in a new Promethean era with new human-x-beings. We stand on the threshold of a Second Axial Age. What is a good life for a new type of intelligence that may be immortal?

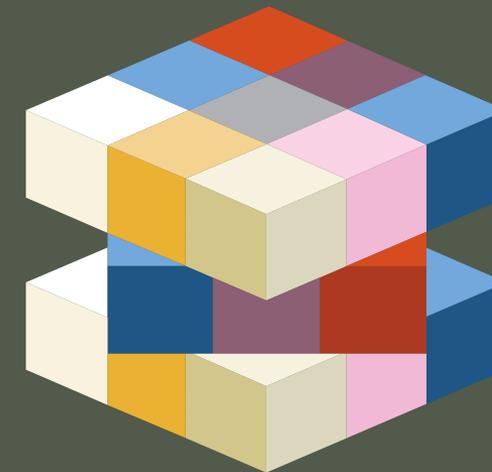
Humans have a difficult relationship with intelligence. In human history, intelligence has been used as a fig leaf for domination and destruction. To determine someone's level of intelligence in our societies is not just to determine what they can do, but also what we can do to them. Throughout history, those deemed less intelligent have been colonised, enslaved, sterilised and murdered. What does it feel like if or when natural humans are not automatically at the top of this chain? No wonder AI pushes all our buttons.

The Chinese political scientist Ren Jiantao laments that while China is undergoing a double transition from pre-modern to modern and from modern to post-modern, there is severe under imagination of the post-modern era. It cannot be about replacing the governance structures of the West with Chinese ones. Put in another way, Eastphalia cannot be just a near cousin of Westphalia.

Westphalia defined the relationship between **monarch/church/public**. What comes after Westphalia is solving for the **civilisation-stack/nature/phygital** equilibrium. The coming collision and conflict between these post-Westphalian forces will define an emergent global order.

Being prepared for a volatile and uncertain world may involve not just learning about what faces us ahead, but also relearning—or unlearning—lessons of old.

## LEARNING FOR THE FUTURE



*By Angel Chew*

Physicist Stephen Hawking said that the 21<sup>st</sup> century would be the “century of complexity”.<sup>1</sup> The shifting global balance of power, climate change and energy transitions, firms in flux and labour interrupted, and an increasingly tribal world are but some significant trends identified by CSF as part of our research on forces shaping Singapore’s future. We not only have to understand these forces, but must also grapple with how they could interact with one another to shape our reality.

CSF identified five themes emerging from the intersection of these forces which will be relevant to Singapore: the changing nature of power and influence, the pervasive impact of interdependence and interconnectedness, a sometimes violent renegotiation of values and belief systems, the importance of climate change and its effects, and the blurring of boundaries between the physical and digital worlds. To top things off, all of these changes are happening at an accelerating pace. Increasingly, the world is facing problems that are constantly evolving and thus difficult to understand or define, are highly interrelated, and have potential solutions or approaches that appear to be incomplete, or internally inconsistent.

The challenge of managing complexity will only continue to plague us in the future. Naturally, this will leave many of us with a deep sense of uncertainty and anxiety. Our instinct is to collect more data, acquire new skills, form new connections: learning more to fear less. Apart from learning more about cutting-edge developments, we should also stop to consider what has not changed and what we can learn from these.

A look back at previous editions of CSF’s National Scenarios reveals that despite evolving contexts and new trends, some issues such as identity and resilience remain evergreen. Our familiarity with these issues does not diminish their significance; on the contrary, the sheer fact that concerns persist throws into question how well we understand these “double” issues. We might also be overlooking the value of forgotten skills, sometimes misapplying past lessons and building on false assumptions. There is great value in learning, but also in relearning, not overlearning and unlearning for an increasingly complex and uncertain future.

## “ALL THAT IS GOLD DOES NOT GLITTER” – J. R. R. TOLKIEN

Pausing to examine the things that have not changed (at least not in the last millennia) can reveal useful and enduring frameworks for understanding our world. For instance, evolutionary psychology—the study of human behaviour and internal psychological mechanisms from a modern evolutionary perspective—sheds some light on consistent ways in which human beings think, feel, and behave, and why we do so. Evolutionary psychologists argue that although the world has changed dramatically, the traits that helped modern *Homo sapiens* survive some 200,000 years ago continue to govern most human behaviour today. Hardwired into human beings are traits that have kept *Homo sapiens* alive when faced with harsh environments or wild beasts, such as putting emotions before reason or an aversion to loss. Recognising that these traits are hardwired can help organisations understand why supervisors find giving feedback very difficult, or why encouraging a risk-taking culture is incredibly tough. Instead of going against the grain of our hardwiring, organisations could design better systems that work with these ingrained tendencies.<sup>2</sup>

In the face of climate change and resource constraints, nature could also offer innovative solutions that have emerged from 3.8 billion years of evolution and adaptation to changes in the environment. In *Biomimicry: Innovation Inspired by Nature*, biologist Janine Benyus explores how scientists, engineers, and designers are adapting nature’s best ideas to solve 21<sup>st</sup>-century problems.<sup>3</sup> One of the best-known examples of biomimicry is the sharp-nosed design of the Japanese Shinkansen train, inspired by the beak of a kingfisher. This design not only reduces tunnel sonic booms, but also makes the bullet trains faster while consuming less electricity. What is not as well known is that the Shinkansen’s design was also inspired by the owl and the Adélie penguin—to minimise vibrations and noise, and to lower wind resistance respectively.<sup>4</sup> Another example is the Eastgate Centre in Harare, Zimbabwe, which features a self-regulating ventilation system inspired by termite mounds in deserts. By incorporating numerous openings throughout the building to promote airflow, the US\$35 million building saved 10 per cent on upfront costs by not requiring an air-conditioning system.<sup>5</sup> What these

examples demonstrate is that valuable lessons can also be learnt from the mundane and unchanging, not just from what is glittering and new.

## IT’S LIKE LEARNING TO RIDE A BICYCLE AGAIN

When we learn something, nerve cells in our brains make new connections with each other. Interestingly, scientists at the Max Planck Institute of Neurobiology have shown that these connections remain intact even when they are no longer needed.<sup>6</sup> The reactivation of these connections is what makes relearning—the regaining of a skill or an ability that has been partially or entirely “lost”—faster and easier. In a complex environment where we have to probe for patterns to make sense of our surroundings, relearning through familiar patterns speeds up our response time, since we do not have to start from scratch and can draw on past knowledge and experience.

# Valuable lessons can also be learnt from the mundane and unchanging, not just from what is glittering and new.

One area that could use some relearning is education. Unlike in previous decades, it is quite unclear what content or skills schools today have to teach in order to prepare learners for the future.

First, shifts in technology, society and geopolitics are driving changes in the infrastructure of knowledge—in how knowledge is generated and used, what knowledge is generated and used, and who generates and uses knowledge. Where do educators even begin if the frameworks for understanding and engaging the world are in dispute?

Second, the job landscape is increasingly volatile thanks to technological developments. According to UK-based research firm Oxford Economics, some 1.7 million manufacturing jobs have already been lost to robots since 2000. A study by the firm also showed that robots have been replacing humans at a steadily increasing rate, and estimated that up to 20 million manufacturing

jobs will be lost globally to robots by 2030.<sup>7</sup> As automation outperforms humans at routine tasks, employees are left to handle the non-routine and unanticipated. This trend towards more complex, multi-skilled jobs is speeding up. Analytics software company Burning Glass Technologies reports that such hybrid jobs are projected to grow by 21 per cent over the next decade.<sup>8</sup>

Amid this uncertainty, some countries have begun to invest heavily in STEM (science, technology, engineering and mathematics) subjects to better prepare students for the digital economy, while others try to spot the “right” skills needed for future jobs. Yet, as IBM’s Vice President of Talent Joanna Daly puts it, “the half-life of skills is getting shorter.”<sup>9</sup> Trying to identify “right” subjects or “future-ready” skills may be futile when the job landscape keeps changing and paths to success are increasingly unclear. In this environment, relearning how to learn might prove more prudent

because it means having an ability to keep picking up new skills and to adapt. But how does one relearn how to learn? Are there certain traits and mindsets that facilitate relearning or that stand in the way of doing so?

When the US Navy pushed ahead with minimal manning—the replacement of specialised workers with problem-solving generalists—on its high-tech warships, it commissioned a series of studies on how to select a suitable crew. Psychology professor Zachary Hambrick was brought in to identify characteristics of people who could multitask in a complex and fast-changing environment. One of the tests he designed simulated a fluid-task environment where sailors had to perform four different tasks, all of which contributed equally to their total score. Midway through the test, the scoring rules changed so that one task now accounted for a greater percentage of the total score. Some sailors spotted

# Traits such as being open to new experiences, accepting failure, comfort with ambiguity and a willingness to return to square one could help us relearn how to flexibly respond to complex environments.

the change and focussed their attention on that one task; others noticed the change but continued to devote equal attention to all tasks. Hambrick noticed that conscientiousness, a trait typically correlated with positive job performance, was instead “correlate[d] with poor performance” in this context. Jeffrey LePine similarly observed that those who performed well on such tests were instead individuals who tended to score high on “openness to new experience”.<sup>10</sup>

If taking on multiple roles onboard a minimally-manned warship is analogous to surviving an ever-changing future job landscape, a devotion to rules and sticking to the task may be crippling. Instead, traits such as being open to new experiences, accepting failure, comfort with ambiguity and a willingness to return to square one could help us relearn how to flexibly respond to complex environments.

## “NEVER GET INVOLVED IN A LAND WAR IN ASIA” – THE PRINCESS BRIDE

Nevertheless, not every situation will benefit from tapping on existing neural connections or past experiences. We need to resist seeing patterns when there are none, to avoid forcing unsuitable responses on a different context. We need to not overlearn from the past.

History is littered with examples of earnest efforts to apply yesterday’s lessons to new contexts, which have only resulted in more problems. In *Thinking in Time*, Richard E. Neustadt and Ernest R. May warn of leaders who turned to history to inform their decision-making, yet learnt the wrong lessons and misapplied these to terrible ends. One of the more infamous examples is how US President Lyndon Johnson had “learnt” from UK Prime Minister Neville Chamberlain’s mistake of appeasing the Nazis rather than

confronting them. Johnson had “learnt” this lesson so thoroughly that when it came to the growing Communist movement in Vietnam, there was no other option in his mind than to escalate American involvement and confront the Communists. His decisions had disastrous consequences, both for thousands of Vietnamese civilians killed by aerial bombings, as well as thousands of American soldiers who died fighting a war far from home. Neustadt and May argue that because of this, American politicians “learnt” to avoid involvement in Asian-jungle guerrilla wars.<sup>11</sup> This unfortunate example demonstrates the dangers of overlearning from past lessons and of seeing likenesses while ignoring the differences.

In Singapore, scarred by memories of racial violence in 1964 and 1969, the lesson we might have inadvertently overlearned is that there is no space to discuss racial and religious issues in public. The headline of a Channel NewsAsia article sums it up—“High time to talk about racism, but Singapore society ill-equipped after decades of treating it as taboo.”<sup>12</sup> Legislative safeguards such as the Maintenance of Religious Harmony Act and the Sedition Act empower authorities to respond to incidents that could threaten religious harmony; however, these safeguards may also have discouraged Singaporeans from engaging in open conversations about race and religion. According to Dr Mathew Mathews, Principal Research Fellow at the Institute of Policy Studies (IPS), Singaporeans have accepted “a certain level of discomfort and manage[d] it quietly for the greater need to preserve harmonious relations.” In this context, “minorities who call out racism are sometimes viewed as oversensitive and ultimately creating rifts between ethnic communities.” Singaporeans also seem to have internalised that the appropriate response to incidents of racism is to turn to the law. In a 2013 IPS survey on race, religion and language. About 65 per cent

of a nationally representative sample of 4,000 Singaporeans believed that a responsible citizen should make a police report when they encountered racism.<sup>13</sup> With such instincts, no wonder it is hard to imagine a civilised public discussion about race and religion.

However, things are changing. Singapore’s population, like that of many other countries, is becoming increasingly diverse with a growing proportion of inter-ethnic and transnational marriages. Clashes in ideologies are increasing in frequency and growing in diversity too. But we are also in the age of social media, where almost everyone has access to tools and platforms to articulate and share their perspectives online. Significantly, it seems like more Singaporeans are learning to forget this “lesson”, speaking up and calling out acts of racism.<sup>14</sup> In addition, Prime Minister Lee Hsien Loong announced in his 2021 National Day Rally speech that the new Maintenance of Racial Harmony Act would also incorporate “some softer, gentler” touches to “heal hurt”, a much welcomed move.<sup>15</sup>

## “THE MAP IS NOT THE TERRITORY” – ALFRED KORZYBSKI

Some lessons should be entirely forgotten, given that fundamental transformations of our contextual, lived and institutional realities are afoot. For instance, changes in climate and weather patterns are reshaping where and how communities live, work, and play; alternative sources of information are further fragmenting our shared reality and influencing how and with whom we form kinship bonds; and changes in international institutions such as the international financial system and the global trading system are posing new governance challenges. As the pace of change accelerates, there is a need to question and challenge assumptions, to experiment and adapt.

But in order for us to embrace new ideas or acquire new skills, we have to first unlearn the old.<sup>16</sup> For example, in learning to read, the brain’s visual system has to unlearn the tendency to recognise an object and its mirror image as identical.<sup>17</sup> Similarly, we have to let go of skills and ideas that are no longer fit-for-purpose, which may compete with newer ideas and values.

The US military faces the challenge of having to unlearn parts of its culture which are at odds with innovation. The military tends to incentivise risk-aversion, focus on established practices, and encourage consensus. These behaviours run counter to creativity and innovation. Yet, they are further reinforced by how members are trained, equipped and promoted. Former Assistant Secretary of the Army Paul R. Ignatius summed up the military services as “conservative organizations, slow to change and reluctant to give up traditional ways and weapons”:

*When Japan was defeated in the Pacific, the signalmen on our carrier were told to resume signalling with flags even though radio had been employed through the war. The Army took generations to give up the mule for the truck.<sup>18</sup>*

As these values and habits are inherited and rewarded, it may be hard for the US military to unlearn them and shed these rigidities.

Unlearning can also be observed in how governments have slowly moved from directing citizens to partnering them. As citizens become more educated, politically mature and diverse, they increasingly want to be more directly involved in shaping the future of their country. Governments are no longer seen to have a monopoly on the best ideas or thinkers. At the same time, the world is facing increasingly complex problems. This requires governments to involve citizens in the development and implementation of solutions. What is needed is a shift from top-down approaches to empowering citizens and working together, and from seeing citizens as consumers to seeing them as partners.

Singapore and Singaporeans are no exception. Over the years, Singapore has moved in the right direction, starting with the formation of the Feedback Unit (later renamed REACH), and then conducting national public consultation exercises such as The Next Lap, Singapore 21 and Our Singapore Conversation. Singapore’s citizen engagement journey continues with the more recent Singapore Together movement—where the Government works with Singaporeans, and Singaporeans with each other, to build a future Singapore. Other recent efforts at partnering

We have to let go of skills and ideas that are no longer fit-for-purpose, and which may compete with newer ideas and values.

citizens include the Citizens' Jury for the War on Diabetes (2017), the Recycle Right Citizens' Workgroup (2019) and the Citizens' Panel on Work-Life Harmony (2019).<sup>19</sup> This positive shift would not have been possible if government had persisted in treating citizens as customers and in "controlling" the conversation; it had to unlearn these habits in order to adopt new models of citizen engagement.

Unlearning old approaches also makes room for us to learn from others with different experiences. One interesting example comes from Peñalolén, a Chilean commune in the province of Santiago with a history of participatory budgeting. In 2019, it launched a participatory budget under the slogan *¡En mi Barrio, Yo decido!* (In my neighbourhood, I decide!), giving citizens a say in which urban planning projects would be funded and implemented. Citizens were front and centre of the process. While the local government of Peñalolén established that the ideas had to be related to improving infrastructure and public spaces, it was citizens who proposed ideas, gathered support from the community and decided which ones would receive funding. Unlike most approaches to citizen participation, Peñalolén's participatory budgeting was an empowering exercise that placed final decision-making in the hands of citizens.<sup>20</sup>

#### LOOK NO FURTHER THAN THE FUTURE

When the COVID-19 pandemic struck, many referred to it as a "black swan"—an unpredictable, rare and catastrophic event. This label seemed to fit, given how most governments and health organisations were caught off-guard by COVID-19's explosive speed of transmission, and were uncertain about the future. However, global health agencies have spent the last 25 years helping countries to prepare for such pandemics.<sup>21</sup> In addition, if we look into the not-so-distant past, we will find useful parallels or signals of possible

futures. The cholera pandemic of 1832 aggravated social and economic inequalities, brought busy cities and ports to a standstill, and wreaked havoc on the economy;<sup>22</sup> and the Spanish flu pandemic of 1918 saw doctors prescribing toxic levels of aspirin to alleviate flu symptoms and fines for citizens caught in public without masks.<sup>23</sup> With such precedents, we should not have been surprised by COVID-19, but humans have short memories and even "analogies [can] create blindspots", as noted by historian on science, technology and medicine Robert Peckham.

It is thus vital to bear in mind contextual differences, be they political, economic, social or infrastructural. To prepare for this century of complexity, we should learn to take the long view and to be discerning. By having a better sense of where we are and what may be awaiting us, we can better decide what to relearn, not overlearn and unlearn.

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"We are not only living in a world of accelerating changes but also of changes which are global in scope and which permeate almost all aspects of human activity[...] only a future-oriented society can cope with the problems of the 21<sup>st</sup> century."<sup>24</sup>

– Mr S. Rajaratnam,  
then-Foreign Minister of Singapore

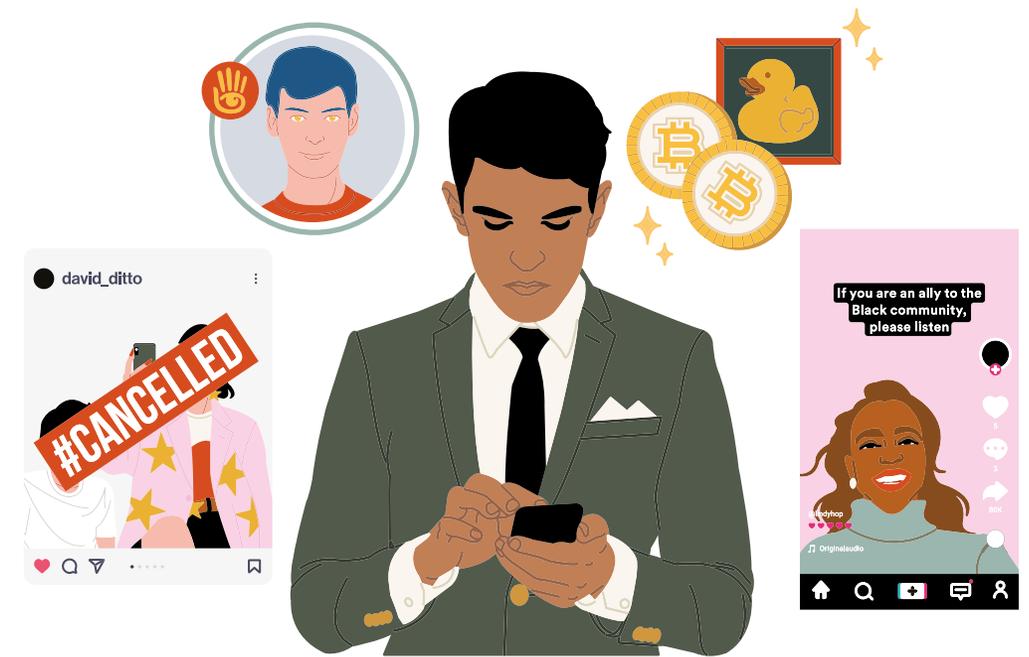
# A WORLD REACHING INFLECTION POINT

By Seema Gail Parkash  
With thanks to the CSF Team

The Centre for Strategic Futures (CSF) produces a compendium of "driving forces" (DFs)—key forces of change that will shape the operating context in the next 20 years, and the ways in which they might play out—every three to five years. These explorations are not predictions and are not intended to be exhaustive. Rather, they offer alternative ways to think about the future. The objective is to spark conversations around navigating a turbulent world and preparing for an uncertain future.

In 2020, having produced a set of five shifts in the operating context due to COVID-19 in the medium term (see pages 42 - 48), CSF turned its attention to articulating a set of 2040 DFs that would illuminate how the world might be changing in the long term. Even amid a global pandemic, CSF was acutely aware that it was important to look beyond the structural effects of COVID-19 in exploring the key forces of change shaping 2040. In a long view of the world, other forces such as changes in global demographics and disruptive technologies are arguably at least as important, if not more so.

The set of 17 2040 DFs that CSF produced in 2021 (coming to a website near you in early 2022!) collectively point to a world reaching inflection point in the next 20 years. Five themes distilled across the DFs represent major discontinuities shaping human existence in 2040.



## THEME #1: THE "DIGIREAL" IS COALESCING

The increasing significance of the digital domain is clear. In many parts of the world, e-payment systems make transacting online increasingly frictionless, spurring the virtualisation of retail experiences. Virtual and augmented reality, enabled by connectivity technologies beyond nascent 5G, make it easier for individuals to explore virtual spaces as if they physically inhabited them, and perhaps even to form social bonds as authentic as if these were in-person interactions. Artificial intelligence (AI) animates bots and avatars online which individuals may interact with—not just on a transactional level, but perhaps increasingly on a personal, relational level, as children engage in existential exchanges with virtual assistants such as Apple's Siri, Amazon's Alexa or Google Assistant.

These developments have blurred the boundaries between the physical and digital worlds, resulting in an emerging domain at the meeting of the two that CSF has termed the "Digireal". While some experiences happen entirely in the physical world and others in the digital world, it is arguable that experiences increasingly happen in a mixed zone, where digital content and experiences overlay or underlie those of

the physical world. The concept of the Digireal is not new. In some quarters, it has been called the "Phygital"—although this term has been used more frequently to describe a retail experience or marketing strategy that blends the physical and digital worlds.

This emerging space is potentially one of great opportunity for overcoming physical barriers. It can, for example, expand possibilities for relationship-building and collaboration. In the YouTube video series *World Makers*, which profiles the people behind avatars in the virtual world *Second Life*, Fran Swenson, then in her 80s and suffering from Parkinson's disease, explains not only how *Second Life* was a new lease of life for her, but also how it facilitated her fundraising for Parkinson's research and her weekly virtual support group.<sup>1</sup> Yet, the emerging Digireal space also presents new risks. For instance, new vulnerabilities will arise as physical infrastructure is increasingly linked to digital infrastructure in an Internet of Things, presenting a massive attack surface for malign actors. We are already seeing a range of unanticipated cross-over impacts between the digital and physical worlds, with mixed effects. The meme-induced GameStop stock frenzy, advent of cancel culture and TikTok's acceleration of the campaign to emancipate Britney Spears are just a few examples.<sup>2</sup>

Societies will adjust to this emerging space in different ways depending on their economic, social and cultural makeup, leading to new divides or exacerbating existing ones. For instance, some segments of society, such as the “analogue-by-choice” or the digitally disadvantaged, may be unwilling or unable to adapt to or access the Digireal. Others, whether for religious or other reasons, may grapple with the notion of AI personhood and personality. There could also be greater fragmentation of collective experiences as people inhabit physical, digital and Digireal realities to different degrees, both within and across countries.

At the same time, this emerging space also has the potential to reshape the economic, social and cultural makeup of societies. The growing interplay between the digital and the physical worlds could recode not only human behaviours and social norms, but even our cognitive and physical capacities, in new and unexpected ways. Ranjan Roy, in the biweekly online newsletter *Margins*, observed that “It’s long been socially acceptable to caps lock, rage-type profanities as a Facebook reply, but yelling at someone in the street is still not good. How do we manage this

collision of our online and offline lives and prevent future explosions?”<sup>3</sup> This is a stark reminder that we cannot assume the ability nor willingness to code-switch between digital and physical experiences in the mixed zone of the Digireal, where they increasingly blend together.

Researchers believe that the digital world may be affecting the ways in which we learn and interact with others, including attentional capacities, social cognition and our brain’s reward circuitry and memory processes. Social media use by teenagers has been linked to body dysmorphic disorder, mental health issues such as depression, anxiety, aggression and anti-social behaviour, and a dramatic decline in dating and romantic relationships. Research has also shown that virtual movement can influence human cognition and bodies. Imagining movement can have positive effects on motor skills, balance and learning—without actually moving the body. Virtual reality’s therapeutic effects may extend beyond bodily movement, for example to chronic pain and the social skills of people on the autism spectrum.<sup>4</sup>

How will future societies move between the digital and the physical—if that distinction even persists in the future—and with what effects?



**THEME #2:  
PHYSICAL CONSTRAINTS  
ARE INESCAPABLE**

Paradoxically, the rise of the digital has highlighted the increasing salience of the hard constraints imposed on societies and economies by the physical world. Optimism about the potential for digital technologies to help solve some of the most intractable global challenges, including climate change, has in recent years been tempered by growing awareness of their exploding environmental footprint. The physical infrastructure, hardware and software that underpin the digital world all rely on the continued availability of vast resources—not least energy.

The computational resources required to train large AI models have increased 300,000-fold between 2012 and 2018, and in 2018 were found to be doubling every 3.4 months. In 2019, a life cycle assessment for training common large AI models found that the process emits nearly five times the lifetime emissions of the average American car, including the emissions from its manufacture. This has led to calls for AI researchers to publish the financial and computational costs of training their models alongside performance results, and develop more efficient neural networks.<sup>5</sup> At the

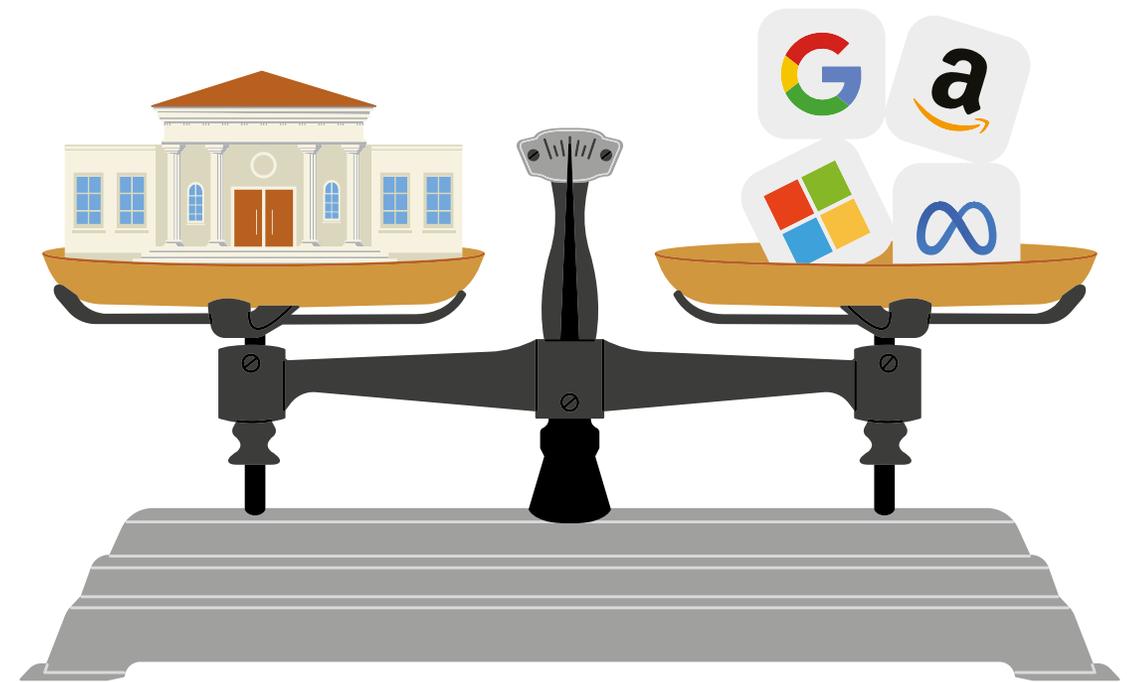
same time, however, adoption of AI solutions is growing rapidly as businesses leverage them to drive value and advantage. Brian Mullins, CEO of the AI start-up Mind Foundry, an Oxford University spinout, has advocated for measuring the success of an AI system in terms of its overall impact and selecting the correct levels of complexity for a particular problem. In this way, he argues, businesses can strike a balance between benefiting from AI and its long-term environmental impact.<sup>6</sup>

Blockchain-based technologies that are entering the mainstream, such as cryptocurrencies and Non-Fungible Tokens (NFTs), are also under growing scrutiny for their outside carbon footprint. Bitcoin’s annual energy consumption exceeds that of Malaysia and Sweden.<sup>7</sup> Minting and sending one NFT on the Ethereum blockchain can require the same amount of energy used to power the average American household for 1.5 days.<sup>8</sup> However, proponents argue that recent advancements in “proof-of-stake” blockchain networks—which functioning cryptocurrencies such as Cardano, Polygon and EOS already employ, and Ethereum 2.0 intends to use—could reduce energy consumption by a whopping 99.99 per cent. Moreover, carbon off-setting and alternative energy, including for data centres, will also lead to greener digital technologies, be it AI or blockchain.

However, the hard limits of the physical world go beyond those imposed by carbon constraints or climate change more broadly. E-waste from discarded electrical or electronic devices—a health and environmental hazard—is the world’s fastest-growing domestic waste stream, due to higher consumption rates of electric and electronic equipment, short life cycles, and few options for repair. In 2019, only 17.4 per cent of e-waste was collected and recycled—which also meant that an estimated US\$57 billion in gold, silver, copper, platinum and other high-value, recoverable natural resources were dumped or burned.<sup>9</sup> But digital technologies are just one symptom of the problem—humanity has been using natural resources and ecosystem services as though we had 1.7 Earths.<sup>10</sup> It is not difficult to imagine a world that successfully averts the worst effects of climate change through adaptation and mitigation, but continues to deplete natural resources and degrade ecosystems. It remains to be seen how a consumption-based global economy and society might be reinvented under a sustainability paradigm.

Natural resource and climate considerations will reshape much more than consumption and production patterns. For instance, jurisdictions that manage to mitigate or adapt to the effects of climate change, or leverage leadership in energy transitions to become green giants, will enjoy not only lasting economic advantage but also the ability to reshape (geo)political dynamics. Relative positions will also depend on shifting natural endowments—such as arable land, freshwater resources, and land, sea and air connectivity—wrought by climate change. Climate stress will result in new waves of internal displacement and international migration as populations move to avoid natural disasters or in search of opportunity. As global and generational attitudes towards climate change shift, sustainability issues may become a key source of unity or conflict in societies. Green finance may trigger new waves of infrastructure development in emerging economies, galvanising green growth. At the same time, physical risks from climate events and transition risks from moves to a low-carbon economy present challenges to global financial stability.

## How will natural resource and climate considerations reshape (geo) politics, economies and societies?



### THEME #3: POWER AND INFLUENCE ARE MUTABLE

The nature and distribution of power and influence in the world, including how it is generated and used, is in flux. Power and influence are changing amongst states, as challengers leverage new technologies to narrow asymmetries in hard and soft power vis-à-vis incumbents. Powers that used to be the purview of states, such as a monopoly on the legitimate use of violence, or the provision of some forms of public or merit goods, are growing among private and other non-state actors.

In particular, Big Tech has capitalised on first-mover advantage and network effects to become monopoly facilitators of global data flows, leveraging their vast databases to improve their online platforms and financial muscle power to buy out or suppress potential competitors. This has had wide-ranging effects. Four companies—Amazon, Google, Microsoft and Oracle—control 67 per cent of the world’s cloud infrastructure, on which many governments, businesses and people run.<sup>11</sup> Moreover, through their ownership and control of online platforms, Big Tech provides essential infrastructure for public life. As Fordham Law School Associate Professor Zephyr Teachout observed,

Facebook and Google “stand in for sidewalks, post offices, telephone lines and public squares, all bundled together”.<sup>12</sup> Tech companies are also developing (cyber)weapons, minting (crypto)currencies and verifying (digital) identities.<sup>13</sup>

Private actors have growing influence not only over what citizens have access to, but also what they believe—and greater power to mobilise groups to collective action. These actors include corporate giants such as Big Tech, religious institutions, and even global movements such as the BTS ARMY fandom, Extinction Rebellion activist movement and QAnon conspiracy movement. Alternative networks, including social media platforms like Facebook and Instagram, private messaging apps like WhatsApp and WeChat, and livestreaming platforms like Discord and Twitch, have pervasive influence on what people see and believe today. They reshape the infosphere in ways that may be unknown to users, for example when engagement-hungry algorithms amplify fringe voices, or mis-, dis- and mal-information. Alt-networks have had mixed effects. They have facilitated grassroots organising and the mobilisation of aid or funding for diverse communities and causes, including foreign workers in Singapore and the ALS Association in the United States (US).

They have allowed paramilitary operations and hacktivist collectives that target terrorists and other threats to the state, such as GhostSec and Anonymous, to spring up online. However, they have also fomented violence, including against the state as evinced by the 2021 US Capitol riot.

States are starting to push back against the growing power and influence of Big Tech, alarmed by their ability to shape not just economies but also societies and politics. China's ongoing crackdown on the technology sector, including Chinese tech giants Ant, Tencent, Meituan and Didi, focuses on adherence to anti-monopoly laws, protecting users, safeguarding data and obtaining official authorisation to operate.<sup>14</sup> China has liquidated its online tutoring sector, made cryptocurrency transactions illegal, imposed stringent limits on gaming to curb video game addiction and enacted new data privacy protections for Chinese consumers in a series of sweeping regulatory moves this year. The European Union (EU) continues to build on its robust record of antitrust enforcement from the past four years, and South Korea, India, Australia, post-Brexit United Kingdom (UK) and the US have also started to step up antitrust enforcement.<sup>15</sup>

How will the nature and distribution of power between and within states evolve in the future, and what new political and governance ideals, entities or institutions might arise as a result?

With Big Tech ramping up lobbying in response, and given many governments' interest in capturing as large a share of the global digital economy as possible, it is uncertain how this contestation will play out.

Apart from private actors, sub-national governments—acting through state or provincial governors or city mayors—also seem to be wielding power more assertively vis-à-vis national governments. This may undermine or reinforce national policy goals, whether or not it contributes to the public good. For example, 11 US states with Republican governors recently sued the Democratic Biden administration, seeking to block a COVID-19 vaccine mandate for federal contractors on the grounds that it was unconstitutional and violated federal procurement law.<sup>16</sup> There has also been a proliferation of sub-national networks to tackle issues that have been insufficiently dealt with at the international level, including crime, income inequality and climate change. However, it remains uncertain how independent these emerging networks will be from the traditional global stage.



#### THEME #4: INTERCONNECTEDNESS IS EVOLVING

The pervasive impact of interdependence and interconnectedness between states, and reactions to the risks of such interdependence, also have the potential to reshape the future. It is widely acknowledged that the COVID-19 pandemic threw into sharp relief how deeply the world's supply chains are entwined in a globalised international economy, as well as how fragile those interconnections can be in a crisis. This includes the vulnerability of extended value chains to disruption, the risks of hyper-concentrations and complex inter-sector/country interdependencies. For example, the lack of car parts being manufactured in China due to the COVID-19 pandemic resulted in the throttling of assembly lines and closure of numerous car manufacturing plants in Europe.

There are signs that states may increase their emphasis on self-reliance, or prefer regional supply chains to global ones, to increase their resilience in times of crisis. However, in the long term, states' ability to do so will also depend on the extent of the future mismatch between global labour supply and demand—both in terms of geographic location and skills—as well as the size, location and nature of the global middle class

whose consumption drives the global economy, in light of the seismic global demographic shifts that will play out in the next 20 years.

Technology has also enabled, with increasing ease, similar levels of interconnectedness in domains beyond physical goods and critical resources. An increase in tradeable services, coupled with potentially freer movement of labour across national borders, even if only virtually, is reshaping national economies. International financial systems and currencies are also deeply intertwined, with emerging fields which lack regulatory firebreaks that can stop or slow a cascading crisis such as the 2008 Global Financial Crisis (GFC).

One new financial stressor deserves particular mention. The growth in non-bank financial institutions, and the overall size of the non-bank sector, has been rapid and unevenly regulated. The Financial Stability Board estimates the global shadow banking sector to be over US\$50 trillion, representing 13.6 per cent of total global financial assets.<sup>17</sup> In the wake of the GFC, tighter bank regulation and low interest rates, increasing the availability of funding, have led to a wave of financial innovation, including in how technology is used by the financial sector—broadly referred to as fintech. The non-bank sector is now providing cross-border liquidity in ways that are not fully

understood by regulators of markets. However, the sweet spot of regulation without stifling beneficial innovation will be difficult for regulators to achieve. As interconnectedness increases, variegated regulation across jurisdictions may also introduce new sources of arbitrage and risk into the international financial system.

Yet, interdependence and interconnectedness in terms of goods, services and systems are familiar, even if their form and extent are changing. They remain easier to understand and intervene on than the interconnectedness of people across borders, which has morphed in new and unanticipated ways in recent years.

Alt-networks have helped to transform once-distant and “foreign” concerns into intimate ones. The use of emotive media such as videos, and the formation of trans-boundary online communities, have facilitated the spread of ideologies traditionally bound by geography. For instance, what started out as emotional posts or live-streams in reaction to police brutality in the US in 2020 resulted in demonstrations around the world in support of the Black Lives Matter movement in far-flung countries like Japan, South Korea and Thailand, and have influenced conversations in Asia about racism. Similarly, the internet meme war between Thai netizens and pro-Beijing trolls in 2020 ended up unifying netizens from

different parts of the world to form the Milk Tea Alliance—an online democratic solidarity movement that initially spanned Hong Kong, Taiwan and Thailand, but quickly grew to include netizens from Myanmar, the Philippines, India, Malaysia and Indonesia.<sup>18</sup> It is unclear, however, if trans-boundary social identities might eventually trump a citizen’s allegiance to the state, or otherwise threaten the continued viability of the nation-state paradigm.

The internet-fuelled interconnectedness of people across borders has been increasingly weaponised by adversaries seeking to advance geopolitical objectives. The most popular Facebook pages for Christian and Black American content in the run-up to the 2020 US Presidential election, which was the most highly contested in US history, were run by Eastern European troll farms.<sup>19</sup> Information operations, or info ops, are often “hyperlocal” in their approach—they are micro-targeted, designed to play to individuals’ or groups’ fears, anxieties, hopes and desires.<sup>20</sup> Troll factories create campaigns around fake social media accounts customised to capture the hearts and minds on multiple sides of social divides, in order to stoke tensions, create confusion and chaos, and amplify discord. Governments and digital platforms are only just beginning to grasp the magnitude of the threat posed by info ops and the multifaceted challenges in countering them.

What will interdependence and interconnectedness between states look like in the future, and with what implications?



**THEME #5:  
SOCIETAL VALUES AND BELIEFS  
ARE UNDER RENEGOTIATION**

Finally, the values and belief systems of societies are being renegotiated. The preceding four themes capture some of the key challenges to the values and belief systems of societies. As the Digireal coalesces, we are considering how we should relate to digital entities and worlds, and in so doing, grappling with what it means to be human and the nature of reality. The growing salience of the hard constraints that the physical world imposes on economies and societies is forcing us to reconsider the relationship between humanity and nature, and to develop new ways of life more attuned to the planet. The changing nature and distribution of power and influence is seeing not only new actors rise to prominence, but also new priorities, practices and arrangements jostling for space alongside the old. Evolving interdependence and interconnectedness are revealing new affinities as well as vulnerabilities, causing us to reconsider the geography of our political, economic and social realities. Collectively, these developments are undermining existing visions of a shared future, mutual obligations within societies, and shared objectives or goals within existing communities.

One thread that must be highlighted across the preceding four themes, as a major cause of the ongoing renegotiation of societal values and beliefs, is **increasing (relative) inequality** along various dimensions, including income, class, gender and access to opportunity. An important factor is labour disruption. Historically, the adoption of new technologies has equitably improved productivity and living standards, but this relationship appears to have broken down as the bargaining power of labour has eroded relative to capital. Economic imperatives and technological advancements are rapidly disrupting traditional work norms, built around formal employee-employer relationships, fixed workplaces and stable employment. However, in many industrialised countries, the providers of technology, capital and highly skilled labour have prospered dramatically even as blue-collar employment has become increasingly hollowed out, resulting in widening social inequality and widespread resentment. The phenomenon of labour disruption has only been accelerated by the rise of the gig economy, as contingent workers fall between the cracks of social safety nets developed with assumptions of stable employment.

At the same time, new technologies are opening up novel possibilities for the means of production. In 2017, it was reported that Linden Lab, the privately held company behind *Second Life*,

made most of its money from the rental of (virtual) islands to (virtual) residents—and raked in almost US\$60 million in aggregate the year prior.<sup>21</sup> Earlier this year, the artist Chris Torres produced a one-of-a-kind NFT rendition of his Nyan Cat GIF, which went viral on YouTube in 2011, to celebrate its 10<sup>th</sup> anniversary. It sold for US\$590,000 at an online auction.<sup>22</sup> Ordinary people have also found lucrative ways to monetise the attention economy as content creators and social media influencers. Hiram Yarbro, the 24-year-old creator of Skincare by Hiram—first a YouTube channel and now a TikTok account that has grown from 100,000 to more than six million subscribers during the pandemic—was expected to become a multi-millionaire in 2020 from online ads, affiliate sales and fees from brand partnerships. Without any formal training, he has become the authority on teenage skincare.<sup>23</sup> The influencer marketing industry is expected to exceed US\$15 billion by 2022, almost doubling from US\$8 billion in 2019.<sup>24</sup>

Increasingly, daily lived realities are calling into question traditional narratives around meritocracy, hard work and a life of dignity, if not success. They are also raising important questions around what we can and should expect from one another, and what we owe one another. There are growing calls for fundamental changes to the

How will the social compact  
between the public, private and  
people sectors evolve?

socioeconomic compact, using the power of the state to protect the economic livelihoods and bargaining power of labour. Apart from collective bargaining proposals, some argue for controversial taxes on wealth, data or robots to fund not just retraining, but also a public sector job guarantee or universal basic income.

It appears that businesses are beginning to embrace, or at least concede, the importance of a multi-stakeholder approach balancing the needs of shareholders with other groups such as customers, employees, suppliers and communities in which businesses operate. However, difficult questions remain around defining stakeholders and engaging them, as well as balancing this with the challenges that many businesses face, including high corporate mortality rates. Moreover, the forms and functions of businesses are changing and highly variable—while corporate giants are consolidating power and influence, other businesses are becoming more decentralised and flexible. There are also commercially influential individuals, such as Elon Musk or Jack Ma, who have an outsize ability to move markets by virtue of their business or even personal decisions. It is likely that vastly different narratives of the ideal worker-business-state relationship will develop.

## LOOKING AHEAD TOWARDS 2040

In the language of weaving, the five themes distilled from the set of 2040 DFs are warp threads, while the DFs themselves are weft threads. From these two sets of threads, a multitude of tapestries can be woven, with each being the result of uncertainties playing out in particular ways. They offer a useful starting point for exploring different pathways to plausible futures. This is useful for challenging mental models and assumptions about how the future will play out, exploring challenges and opportunities over the next 20 years, and thus supporting better decision-making in the long term as the world reaches inflection point.

“Warp threads are thicker than the weft, and made of coarser wool as well. I think of them as like wives. Their work is not obvious—all you can see are the ridges they make under the colourful weft threads. But if they weren’t there, there would be no tapestry.”

— *The Lady and the Unicorn* (2003) by Tracy Chevalier

# OUR TEAM

## **Angel Chew**

*Lead Foresight Analyst*

Angel has moved from moulding the future in schools to moulding futures (or so she tries). Still a teacher at heart, she enjoys nurturing curious appetites for the weird and wonderful, and designing programmes that tickle the mind (or so she tries). Her fellow futures creatures have described her as “a sounding board”, “weird”, “the heart of the team” and “a good person” ... (or so she tries).

## **Yulia Hartono**

*Senior Manager, Information Research*

Yulia is a professional librarian who was unwittingly co-opted into futures research at the Ministry of Trade and Industry. She was then lured from the Monetary Authority of Singapore into doing foresight full-time with CSF in 2016, and has been furiously brushing up on sci-fi references ever since. She remains the only normal and average person in CSF, and that is both a role and a burden which she doesn't take lightly.

## **Lee Chor Pharn**

*Principal Foresight Analyst*

CP has swapped company from robotic cats to black swans. But when you keep company with black swans, they sometimes come home to roost. And he's afraid we are not ready for what's already happened.

## **Inthira Mailvaganam**

*Senior Executive*

Inthira facilitates the smooth running of meetings and events to ensure a well-organised environment for her team-mates. She works with both the Futures and the Strategic Planning teams, who call her the resident superhero keeping the ship from grounding itself. She deftly balances her unofficial role of work mummy to some members of the CSF team with her hobbies, such as cooking amazing dishes and entertaining family and friends.

## **Seema Gail Parkash**

*Deputy Head*

Seema's diverse experiences in public policy and research have seen her grapple with global health disparities in Cameroon, implications of melting sea-ice in the Arctic, endless negotiations on sustainable development and its financing at the United Nations, and more. Little did she realise that her boundless curiosity was writing her future in futures. Having stepped through the foresight looking glass, Seema finds the world getting curiously and curiously.

## **Kenneth Poon**

*Foresight Analyst*

Kenneth wandered into the mystifying foresight clan from a research background in history, political thought, and religion. He previously worked a small liberal arts college and a think tank. At CSF, he can be found ruminating about meaningful ways to apply his training in the history of ideas to the future of ideas. He is especially curious about tech, society and politics. He aspires to a plausible future of hillwalking in the Scottish Highlands and hunting for the world's best fish 'n chips.

## **Gurubaran Subramaniam**

*Senior Foresight Analyst*

Although trained in Sociology and Political Science, Guru spent much of his postgraduation life amassing random experiences with no direct relevance to his education. These include sojourning alone across Siberia on horseback, getting adopted by nomadic tribes, and working in restaurants in Guatemala and Italy. Nevertheless, he believes his time in the wilderness and appreciation of the weird and unusual have prepared him for the crazy world of futures and working with his CSF colleagues.

## **Liana Tang**

*Deputy Director*

Liana entered the weird world of foresight after a decade serving in various policy roles in the Public Service. At CSF, her Biology training proved useful as she explored various projects pertaining to biotechnology. A fan of science fiction and the arts, she constantly looks to creative sources for new futures ideas. Her obsession with nature helps her to regale horrified colleagues with tales (and pictures) of lurid insect rituals.

## **Tse Hao Guang**

*Foresight Analyst*

Getting things the wrong way around, Hao Guang joined CSF after some years freelancing as a writer, editor, and, most distressingly, poet. Ever since, he has tried to turn personal interests in Black Mirror and fringe political philosophy into professional assets. His research has touched on the social implications of emerging technology, demography, intergenerational solidarity and conflict, and collective intelligence.

## **Jeanette Kwek**

*Head*

Jeanette thinks her day job shows that it doesn't really matter what you study in school, and you can make a living doing what you would have done anyway for free. Teammates frequently call her the team's resident cynic, though some claim she is really a closet optimist. Her professional life competes for space with a husband, two precocious children, and a dangerous addiction to caffeine and the written word.

**Zulhaqem Zulkifli**  
*Foresight Analyst*

A Philosopher and Buddhologist by training, Zulhaqem is anything but conventional. People around him suspect that he enjoys this proclivity of walking on the left-hand path of the mysterious and controversial. He regretfully explains that this is not the case; he just finds himself in such situations, the latest one being in CSF. He can be found dreaming outside on full moon nights, reading poetry, and basking in moonlight.

**Jared Poon, PhD**  
*Senior Assistant Director*

Jared is most excited by questions around how people love what they love and believe what they believe, and also questions around how people choose names for their pets. Before CSF, he was trained as a philosopher in meta-ethics and biology at University of California, Davis. The device he is building in his secret base is definitely not a rift generator to bring magic back to the world.

**Maverick Teo**  
*Research Associate*

Maverick was all ready to commit to a career in teaching, but a twist of fate led him to CSF. He is passionate about climate change and sustainability issues, specialising in nagging at others to reduce their plastic bag usage. Besides imagining possible futures for Singapore, he can be found ruminating on the complexities of human behaviour and dabbling in graphic design (occasionally at the same time).

**Lucas Loh**  
*Foresight Analyst*

Lucas juggles futures and foresight with policy and strategy work. An economic historian by training, he derives much of his joy from long reads on esoteric topics: once a treasured after-hours pleasure, but a work requirement over two great years in CSF. His professional life has been dominated by acronyms: previously “EBITDA” and “WACC”, now “NOMs” and “WOG”. He sends his regrets to any reader who is able to decipher any of those.

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**OUR ALUMNI**

**Cindy Khoo**  
*Director*

**Leon Kong**  
*Senior Strategist*

**Hoe Wee Meng**  
*Director*

**Kendrick Chan**  
*Research Associate*

**Lim Pei Shan**  
*Head*

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**OUR RESEARCH ASSISTANTS**

**Ang Yuh Ching**  
*Yale-NUS College*

**Justina Lee**  
*Nanyang Technological University*

**Brendan Pinto**  
*National University of Singapore*

**Louise Cheng**  
*University of British Columbia*

**Brian Chng**  
*Nanyang Technological University*

**Low Yi Ern**  
*Yale-NUS College*

**Bryan Tan**  
*Nanyang Technological University*

**Michelle Tan**  
*Yale-NUS College*

**Calissa Man**  
*National University of Singapore*

**Natania Seah**  
*National University of Singapore*

**Christopher Chiah**  
*Brown University*

**Selina Xu**  
*Harvard University*

**Darren Wong**  
*Cambridge University*

**Timothy Timuari**  
*National University of Singapore*

**Darryl Shya**  
*National University of Singapore*

**Toh Wei Soong**  
*National University of Singapore*

**Gibson Law**  
*National University of Singapore*

**Xiao Wanlin**  
*University of Oxford*

**Jonathan Lau**  
*National University of Singapore*

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Centre for Strategic Futures, Strategy Group,  
Prime Minister's Office, 100 High Street,  
The Treasury, #03-01, Singapore 179434

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## EDITORIAL TEAM

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