

# Futures Thinking

Te Arotake i te Anamata  
mō Ngā Kaunihera

Review into the Future  
for Local Government

Presented by Wendy McGuinness  
CEO of McGuinness Institute  
21 July 2021

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# Agenda

1. Part 1: Future Studies
2. Part 2: Implications
3. Q&A
4. Next steps



# Part 1: Future Studies

History and tools

# 1. 1958



## Problems of simplicity

*Two variables*

Weaver described the seventeenth, eighteenth and nineteenth centuries as the period in which physical science learned how to analyse two-variable problems. These are problems where

*‘... the behaviour of the first quantity can be described with a useful degree of accuracy by taking into account only its dependence upon the second quantity, and by neglecting the minor influence of other factors’*

(Undertaken first, before 1900)

## Problems of organised complexity

*Many interrelated variables*

Weaver goes on to describe a great middle region that had remained relatively untouched by science and yet was critical for the future of humankind:

*‘... But much more important than the mere number of variables is the fact that these variables are all interrelated ... They are all problems which involve dealing simultaneously with a sizeable number of factors which are interrelated into an organic whole.’*

(Undertaken last, from 1950)

## Problems of disorganised complexity

*Numerous random variables*

*‘... [A] large billiard table with millions of balls flying about on its surface, colliding with one another and with the side rails.’*

*‘The great surprise is that the problem now becomes easier: the methods of statistical mechanics are now applicable. ... On the average how far does a ball move before it is hit by some other ball? On the average how many impacts per second does a ball experience?’*

(Undertaken second, between 1900 and 1950)



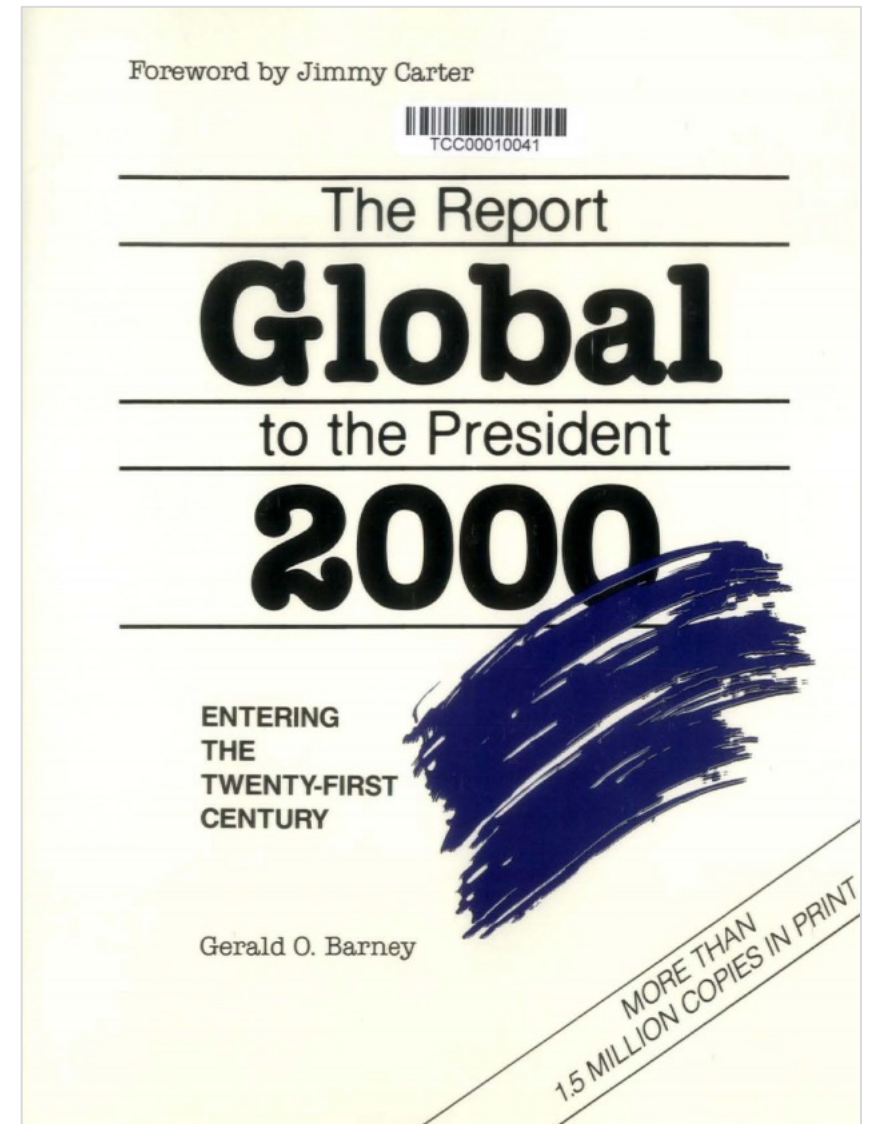
## 2. 1980

*‘The Global 2000 Report to the President presents a picture that can be painted only in broad strokes and with a brush still in need of additional bristles. It is, however, the most complete and consistent such picture ever painted by the U.S. Government.*

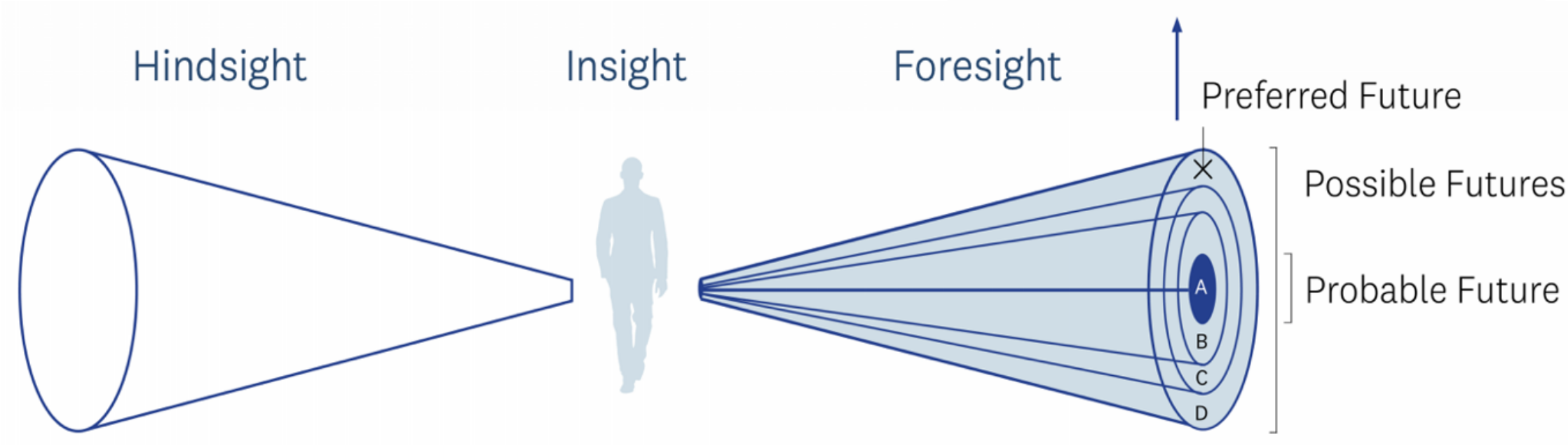
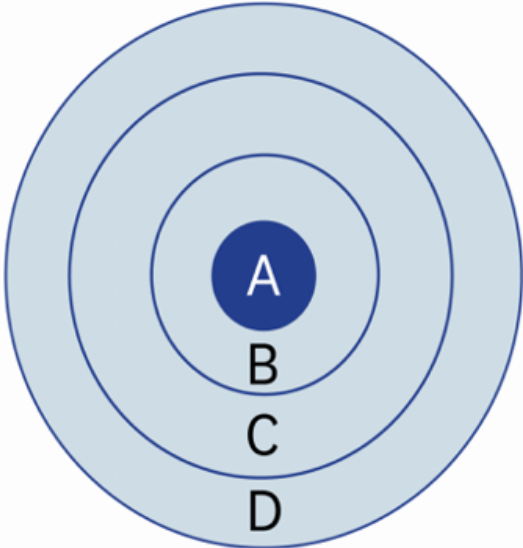
*Many rapid and undesirable developments are foreseen if public policies concerning population stabilization, resource conservation, and environmental protection remain unchanged over the coming decades.*

*Vigorous and determined new initiatives are needed around the world. These initiatives need to be taken soon while the picture is yet fluid and nations are still preparing to enter the twenty-first century.’*

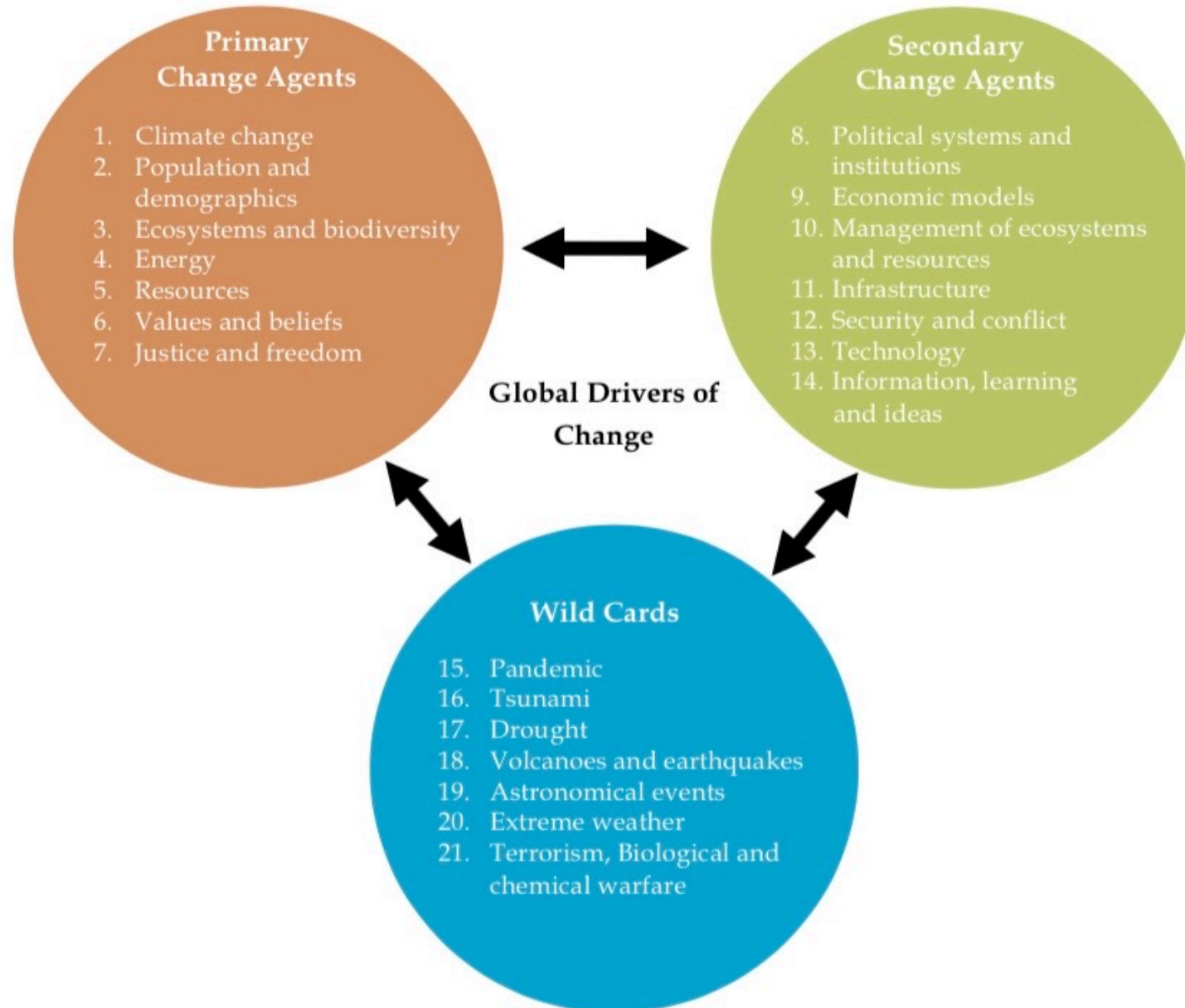
Gerald O. Barney, American physicist and principal author



# Tool 1: Cone of Plausibility



# Tool 2: Global drivers/megatrends



# Tool 3: Matrix (to create scenarios)

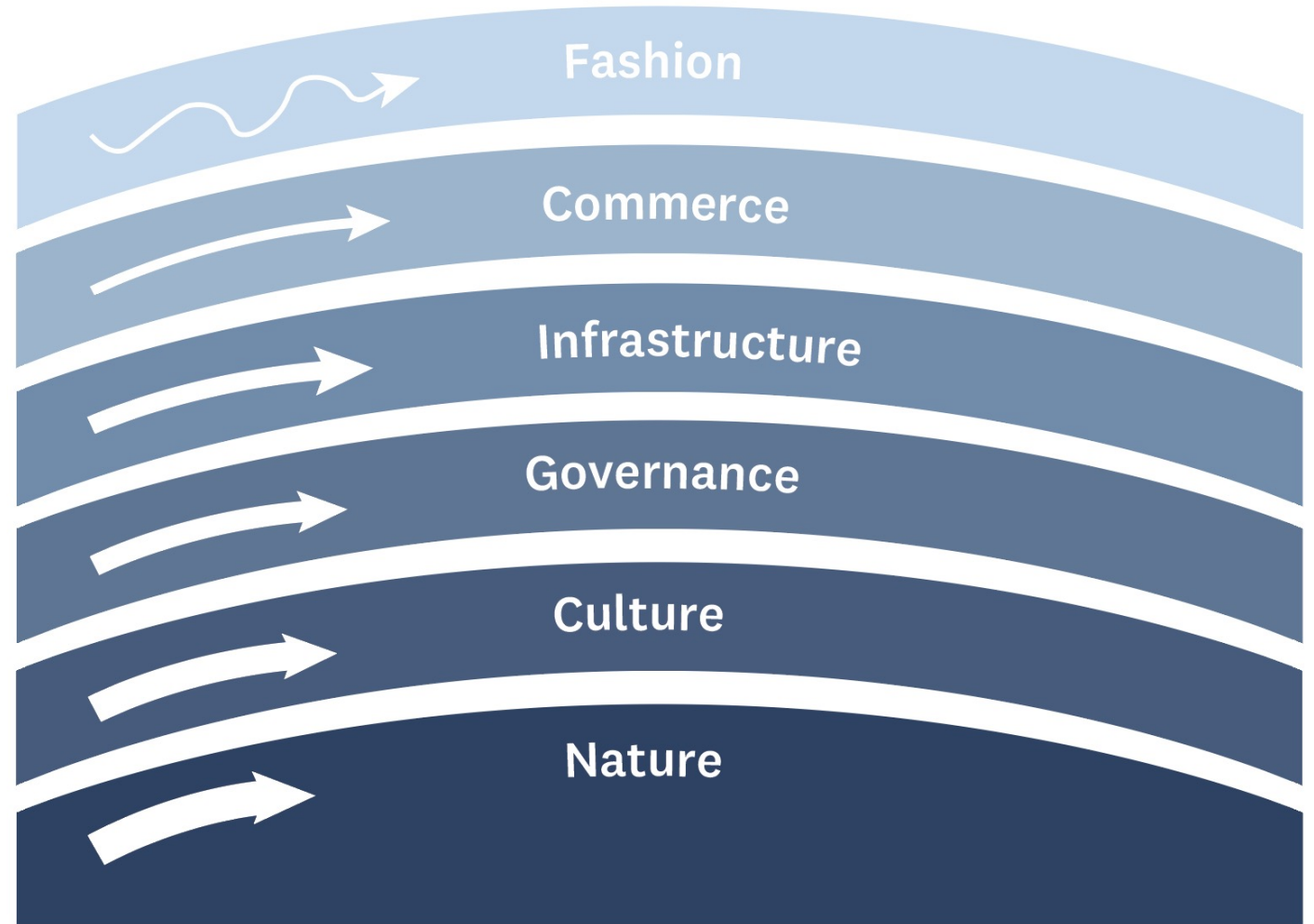
	The world does manage its strengths, weaknesses, opportunities and threats	The world does not manage its strengths, weaknesses opportunities and threats
New Zealand does manage its strengths, weaknesses, opportunities and threats	<p><b>Scenario 1:</b></p> <p><b>Power to the People</b></p> <p>New Zealand ✓</p> <p>World ✓</p>	<p><b>Scenario 2:</b></p> <p><b>An Island Paradise</b></p> <p>New Zealand ✓</p> <p>World ✗</p>
New Zealand does not manage its strengths, weaknesses, opportunities and threats	<p><b>Scenario 3:</b></p> <p><b>Missed the Global Bus</b></p> <p>New Zealand ✗</p> <p>World ✓</p>	<p><b>Scenario 4:</b></p> <p><b>All Over Rover</b></p> <p>New Zealand ✗</p> <p>World ✗</p>



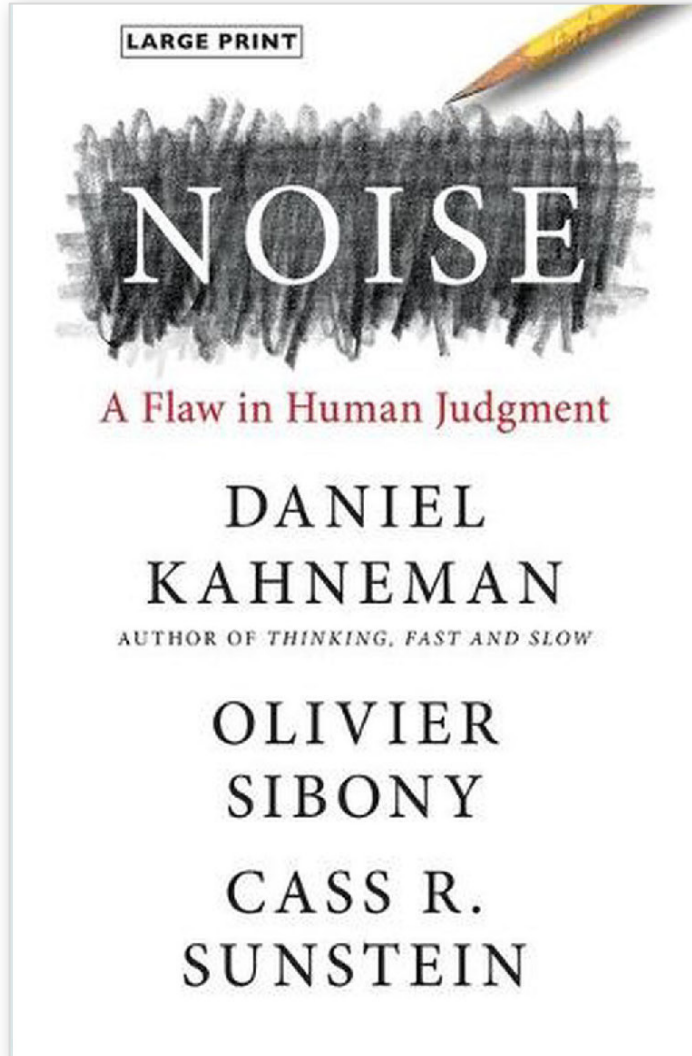


# Tool 4: Pace Layer Thinking (1999)

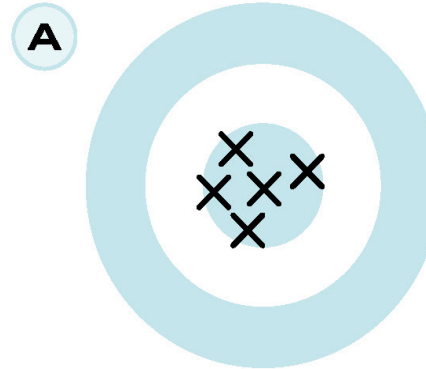
The fast layers (fashion and commerce) innovate; the slow layers stabilize (governance and culture). The slowest layer (nature) does not disrupt often, but when it does disrupt, it disrupts all the layers above.



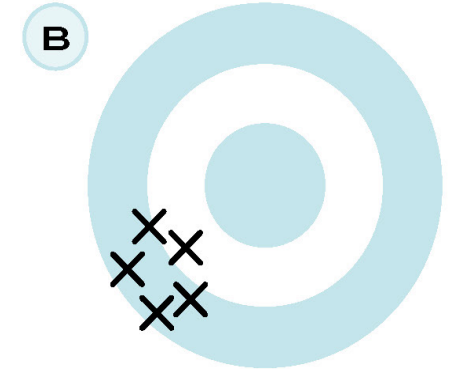
# Tool 5: Types of Error (2021)



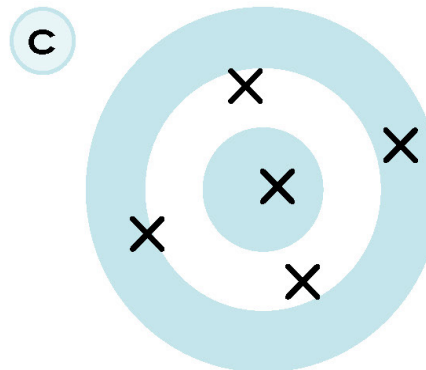
Two types of error: noise and bias



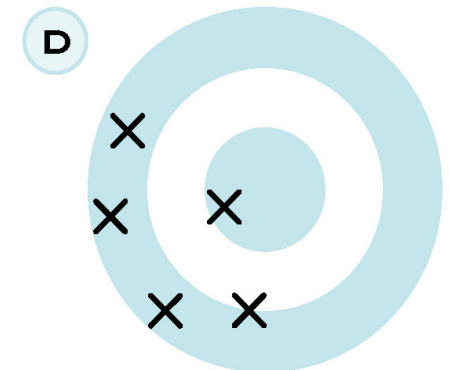
Accurate



Biased

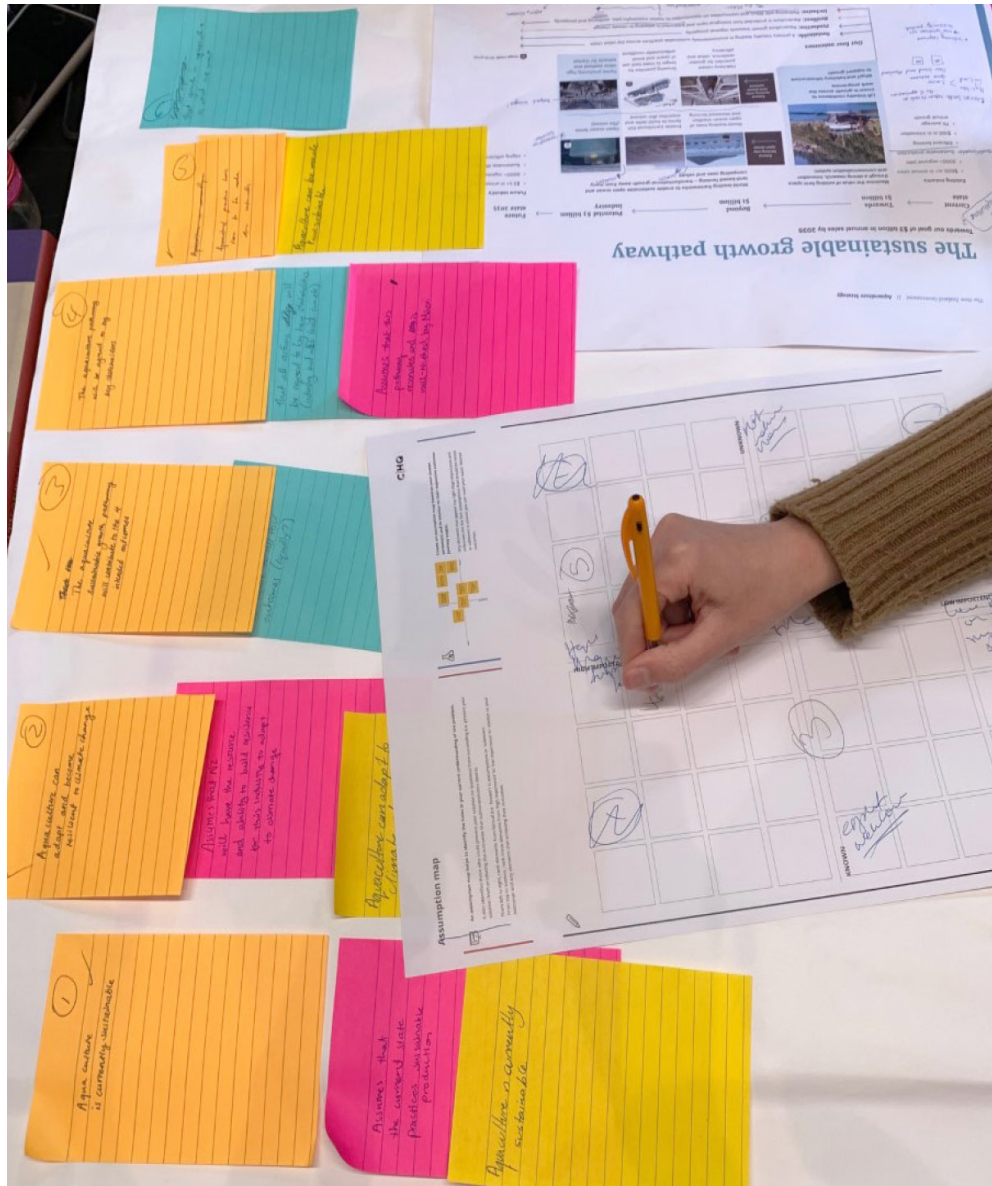


Noisy



Noisy and biased

# Tool 6: Assumption mapping



## Worksheet 2: Assumption mapping exercise

### Explanation

An assumption map helps to test, validate or identify holes in the strategy (an assumption being an unchallenged input that shapes the strategy). It helps identify issues that could prevent the strategy from succeeding.

**Step 1: Write down a list of assumptions that you think may exist.** (e.g., use sticky notes – but not orange ones)

**Step 2: Sort similar assumptions** and then choose a high-level assumption to reflect the group (e.g., use an orange sticky note).

**Step 3: First rank these high-level assumptions from top to bottom** on the left of the diagram below by whether they have a high or low impact (magnitude) on the success of the strategy (use the orange sticky notes only on this worksheet).

**Step 4: Second move these high-level assumptions across the diagram** from left to right to show what is explicit (well recognised) and what is implicit (not well recognised).

**Step 5: Now think about how you could move the assumptions from right to left and/or from top to bottom.** Note: You will not be able to remove all assumptions, but by making them more explicit/transparent you are ensuring you know when you are taking a calculated risk. This will ensure when the strategy is reviewed or assessed, learnings can be made, and action can be taken early (saving money and time).



High magnitude

If the assumption is incorrect, it will impact the success of the strategy


Explicit ← How well acknowledged is the assumption? → Implicit


Low magnitude

If the assumption is incorrect, it will not impact the success of the strategy

## **Part 2: Implications**

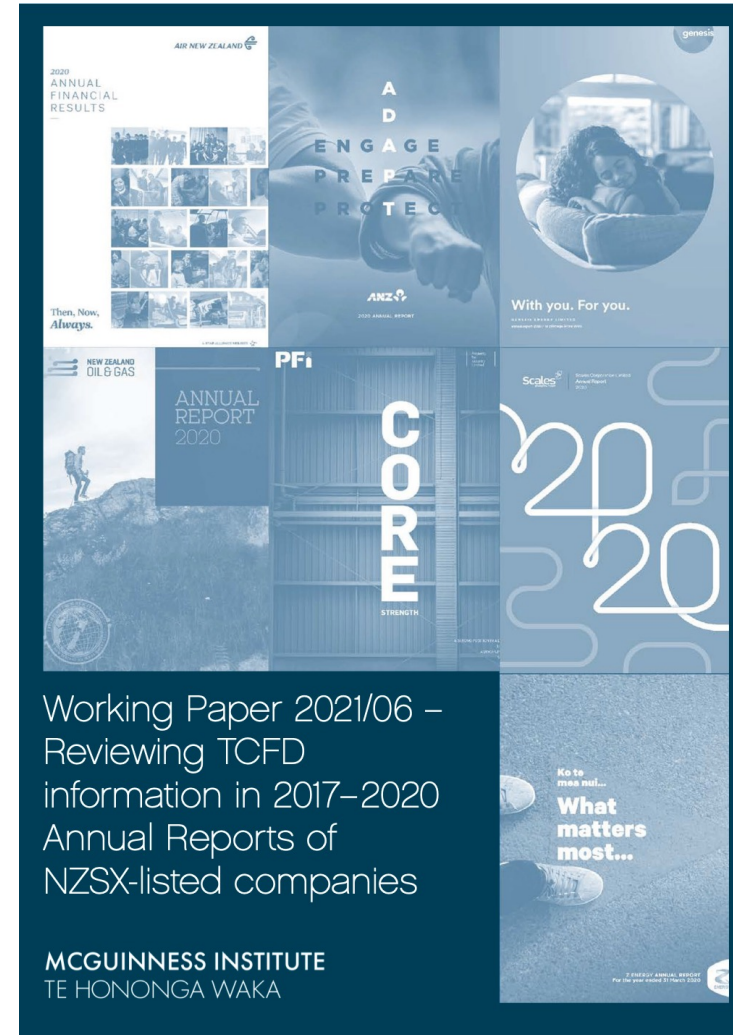
Climate change exercise

# Linkages between projects



# Fear brings change

Settled times deliver settled politics



# Emergency 1: COVID-19 – the short emergency

December 2005

As suggested by Druckman, the seminar clearly identified that a phased process was likely, and that each phase would require a different response. Consequently, it is clear businesses, communities and families should plan for:

- (i) a potential full border closure until a vaccine is developed.

The period of time between the first outbreak and the development of the appropriate vaccine will be a critical factor in managing the risk. This is currently expected to be in the range of six weeks to six months. Consequently, the longer New Zealand can keep the virus out (i.e. reduce the gap), or ideally, completely prevent the virus entering New Zealand (resulting in the second phase not occurring), the fewer negative effects on human health and the economy.



**NEWS**

## Managing the risk of a 'bird flu' pandemic – a Chartered Accountant's perspective

By *Wendy McGuinness*



Wendy McGuinness is an Institute Councilor and member of the Sustainable Development Reporting Committee. She is a risk management consultant and editor of [www.sustainablefuture.info](http://www.sustainablefuture.info).

International concern about the so-called "bird flu" continues to rise, and a growing number of companies are realising they need to launch their own "pandemic contingency plan", as reported in the *Financial Times* in October.

Myles Druckman, vice-president of medical assistance at International SOS, a US-based medical consultancy with 6,400 corporate clients, stresses that while companies may have general contingency plans in place, "you have to tailor your responses to a potential pandemic, which are a little different from, say, a bomb ... A pandemic is a phased process and you need to be able to respond differently at different stages."

In this article I review the current landscape and provide a general context for further thought and discussion. To this end, Chris Peace of Risk Management Ltd has contributed a graphical assessment of the pandemic risk compared with other, national scale risks; and Rachel Farrant, a partner at BDO Spicers, has supplied some responses to key questions about what a pandemic might mean for Chartered Accountants in public practice.

**The current landscape**

A seminar held at Te Papa in Wellington on 1 November by the New Zealand Society for Risk Management Inc, entitled *Avian influenza (bird flu) – the next pandemic?* (sponsored by MARSH, Solid Energy – Coals of New Zealand, URS New Zealand, Air New Zealand and ACC), drew the big picture. Table 1 outlines seven key observations from the seminar.

The scale of risk due to an influenza pandemic is significant as shown in Figure 1, where the risk levels (after taking into account current controls) of four events are mapped and compared: the influenza pandemic (risk 1), a nuclear-powered ship suffering a radiation leak in Wellington harbour (risk 2), a major earthquake in Wellington (risk 3) and a Boeing 737 crash (risk 4). As can be seen, the current level of control for an influenza pandemic still

leaves the country exposed to a high level of risk, whereas the other risks are at much more acceptable levels.

As suggested by Druckman, the seminar clearly identified that a phased process was likely and that each phase would require a different response. Consequently, it is clear businesses, communities and families should plan for:

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Figure 1. Controlled Risk Matrix: national scale risks in New Zealand

Risk	Control Consequence	Control Likelihood	Control Risk
1 Avian influenza – national impacts	Major	Almost certain	Extreme
2 Radiation from nuclear powered ship	Negligible	Almost incredible	Low
3 Earthquake on the Wellington fault	Moderate	Rare	Medium
4 B 737 crash – domestic flight	Minor	Almost incredible	Low

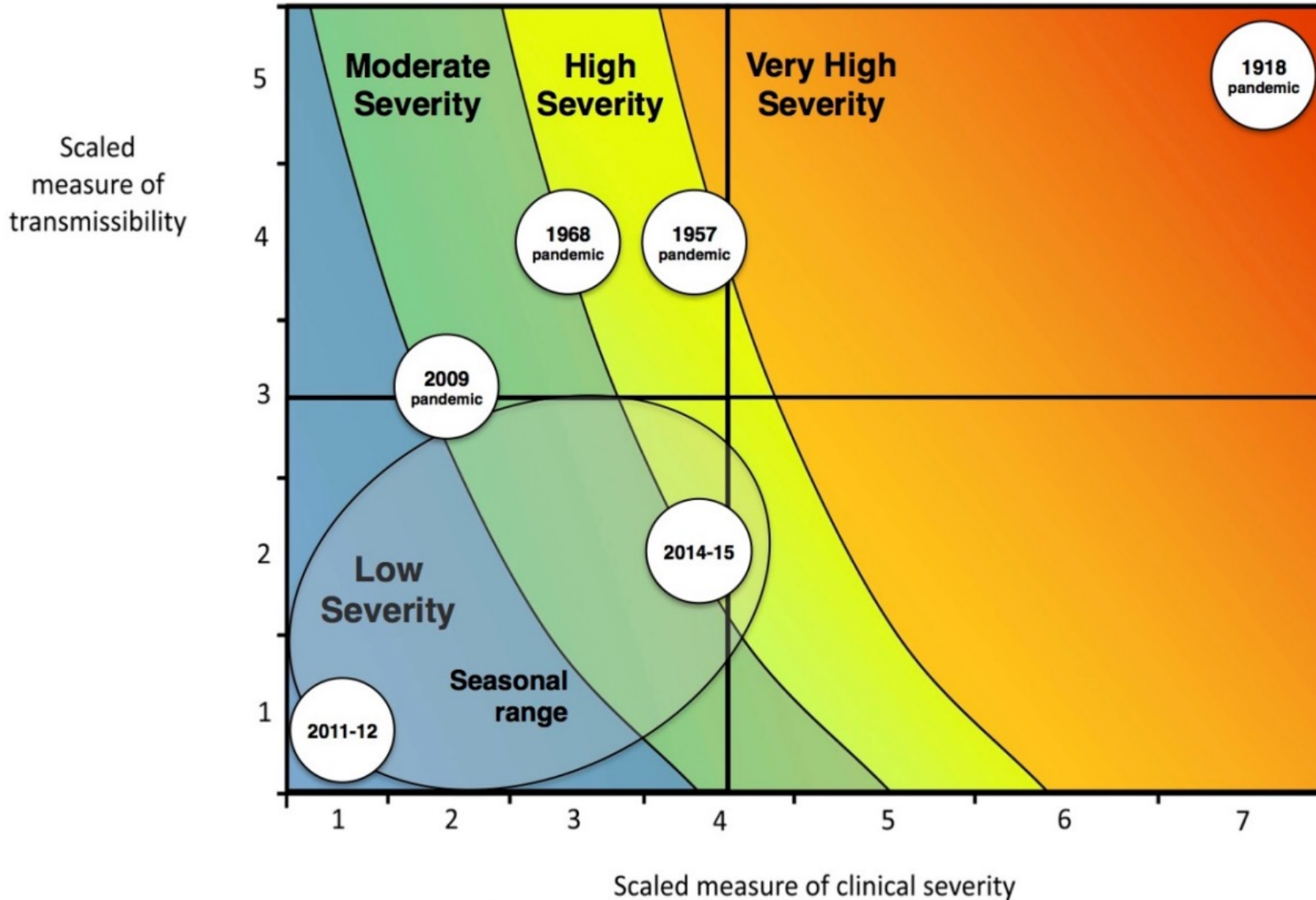
(Source: Risk Management Ltd, November 2005)

Chartered Accountants Journal, December 2005



# Our pandemic future

2017: The CDC Pandemic Severity Assessment Framework (PSAF)





# Distancing strategy: flattening the COVID-19 curve

11 March 2020 (2 weeks before New Zealand entered Alert Level 4, a nationwide lockdown)

11 March 2020

## 1. Social distancing

- (a) Stop big meet-ups/events
- (b) Separate people (e.g. working from home or working in shifts)
- (c) Isolate over 50s and those with existing health issues (e.g. they work from home)

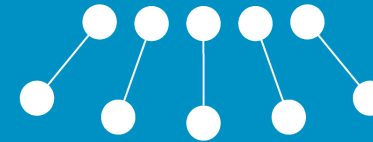


## 2. Parallel health systems

- (a) Alternative COVID-19 health system run by healthy young people on the front line and older experts on the phone
- (b) Make private hospitals COVID-19 hospitals
- (c) Set up Community Based Assessment Centres



## 3. Manage infrastructure and diversify supply chains

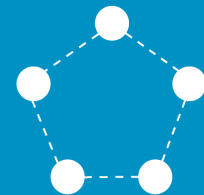


## 4. Command & control

- (a) Alert codes
- (b) Situation reports
- (c) If this ... then that
- (d) Support Pacific neighbours



## 5. Community commitment and lockdown protocol



## 6. Informed individuals

- (a) Explain NZ is in uncharted waters, but we know through overseas examples the strategies that work
- (b) Extend sick leave from five days pa to 20 days pa for next six months



## 7. Know and promote this number:



0800 358 5453

'For COVID-19 health advice and information, contact the Healthline team (for free) on 0800 358 5453 or +64 9 358 5453 for international SIMS.'

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With assistance from Roger Dennis

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@McGInstitute

Here are seven ideas on how we might flatten the COVID-19 curve! The flatter the curve, the less strain on our healthcare system, which means better care for all.

We are keen to hear your feedback and ideas

#COVID19 #coronavirus #pandemic #riskmanagement

Distancing strategy: flattening the COVID-19 curve

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Roger Dennis and Dr Siouxsie Wiles

5:32 PM · Mar 11, 2020 · Twitter Web App

52 Retweets 3 Quote Tweets 109 Likes



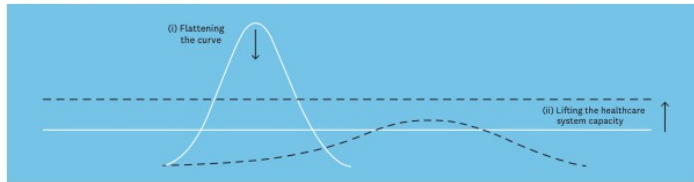
# The long normal

April 2020

## Why complacency must be avoided

### The Long Normal: Preparing the National Reserve Supply (NRS) for pandemic cycles

Think Piece 33: April 2020



Two strategies for managing COVID-19.

#### Wendy McGuinness

Institute CEO Wendy McGuinness is a FCA and has an MBA from Chicago. She is co-author of the 2015 report *Lessons From the West African Ebola Outbreak in Relation to New Zealand's Supply Chain Resilience* and author of the 2006 report *Managing the Business Risk of a Pandemic: Lessons from the Past and a Checklist for the Future*.

Pandemics are not uncommon. The COVID-19 pandemic is the fifth global pandemic in just over a century (previous pandemics began in 1918, 1957, 1968 and 2009). When looking back over time, pandemics can be seen as part of the normal cycle of events, what the Institute calls 'The Long Normal'. In this context, taking the time to reflect on New Zealand's performance to date may not only reduce further healthcare shocks during this pandemic but also help the country prepare for the next.

#### Why complacency must be avoided

The four pandemics in the last century (mentioned above) were all types of influenza. They all come from one family of viruses: technically known as A(H1N1), A(H5N2), A(H3N2) and A(H1N1) respectively. In contrast, COVID-19 is a disease generated by a human coronavirus. Importantly, human coronaviruses have only been around since the 1960s; before that time coronaviruses were only found in animals.<sup>1</sup>

What is concerning is that two smaller human coronavirus outbreaks have occurred over the last 17 years: the 2003 Severe Acute Respiratory Syndrome (SARS) (technically called SARS-CoV) and the 2012 Middle East Respiratory Syndrome (MERS) (technically called MERS-CoV).

The COVID-19 pandemic is therefore the third significant human coronavirus outbreak in just under two decades. To date, a vaccine has not been developed for any type of human coronaviruses 'despite the fact that the 2002 SARS and 2012 MERS outbreaks, both caused by viral cousins of the new coronavirus, were warning shots that claimed about 1,600 lives'.<sup>2</sup>

The fatality rate is also an important consideration. The World Health Organization (WHO) believes the SARS mortality rate was in the vicinity of 15% of confirmed cases, while MERS was about 34% of confirmed cases.<sup>3</sup> In comparison, WHO believes COVID-19 mortality rates sit between 3-4% of confirmed cases.<sup>4</sup> Given the increased number of human coronavirus outbreaks in the last 17 years, it is particularly important to build New Zealand's healthcare system now in preparation for another, more deadly, pandemic in the next few years.

#### What this means for New Zealand

The COVID-19 pandemic presents an opportunity to learn the lessons now for what might lie ahead. Vaccines take time, in which case the onus falls on the Government to minimise the impact of a pandemic. This means practices must be transparent and able to be scrutinised by all; every failure must be identified and every success understood.

This think piece looks at what can be learnt so far: what information is transparent (and what remains hidden and unable to be scrutinised) and what public policy solutions might be useful in the future. There is a particular focus on the national reserve supply (NRS) and resourcing of personal protective equipment (PPE) to frontline health workers.

#### Flattening the curve and lifting the healthcare system's capacity

New Zealand's first case of COVID-19 was confirmed on 28 February 2020 – almost a full month after most of Europe and the United States. New Zealand has been able to learn from the experiences from other countries, and has therefore been able to quickly implement a full lockdown. For more on the COVID-19 country curves see the graphs at the end of this think piece.

New Zealand's response to the COVID-19 pandemic has been to 'flatten the curve' by eliminating the coronavirus in New Zealand. The country was placed in a month-long lockdown from 26 March 2020. A second strategy, see Figure 1 above, is to 'lift the healthcare system's capacity' to deal with pandemics, particularly in regard to the storage and distribution of the NRS. How the system is meant to respond to a pandemic is set out in a collection of Ministry of Health (MoH) documents (see Appendix 1 for a table of MoH's pandemic planning documents).

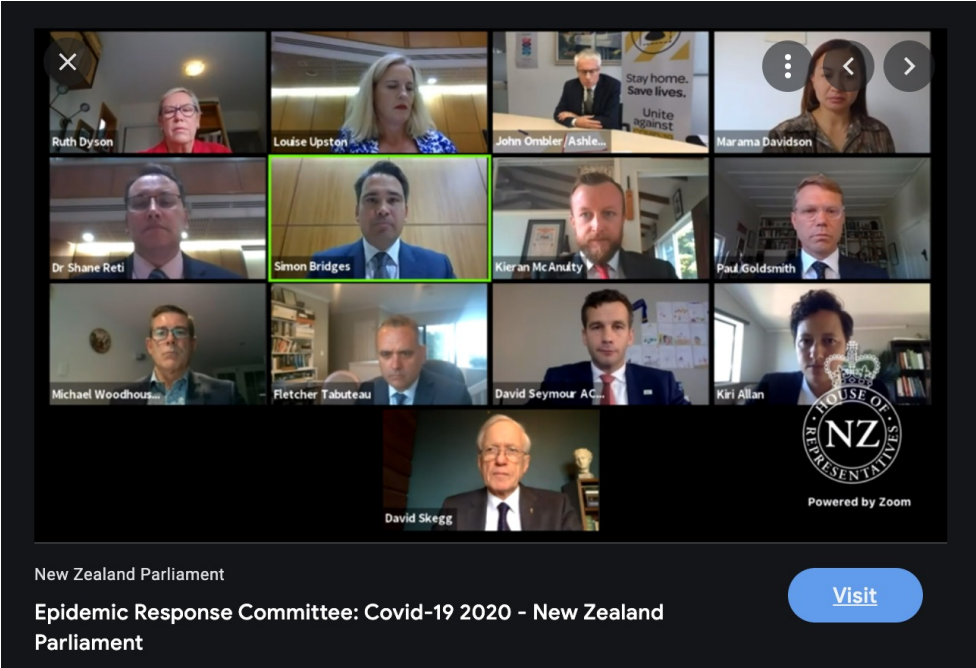
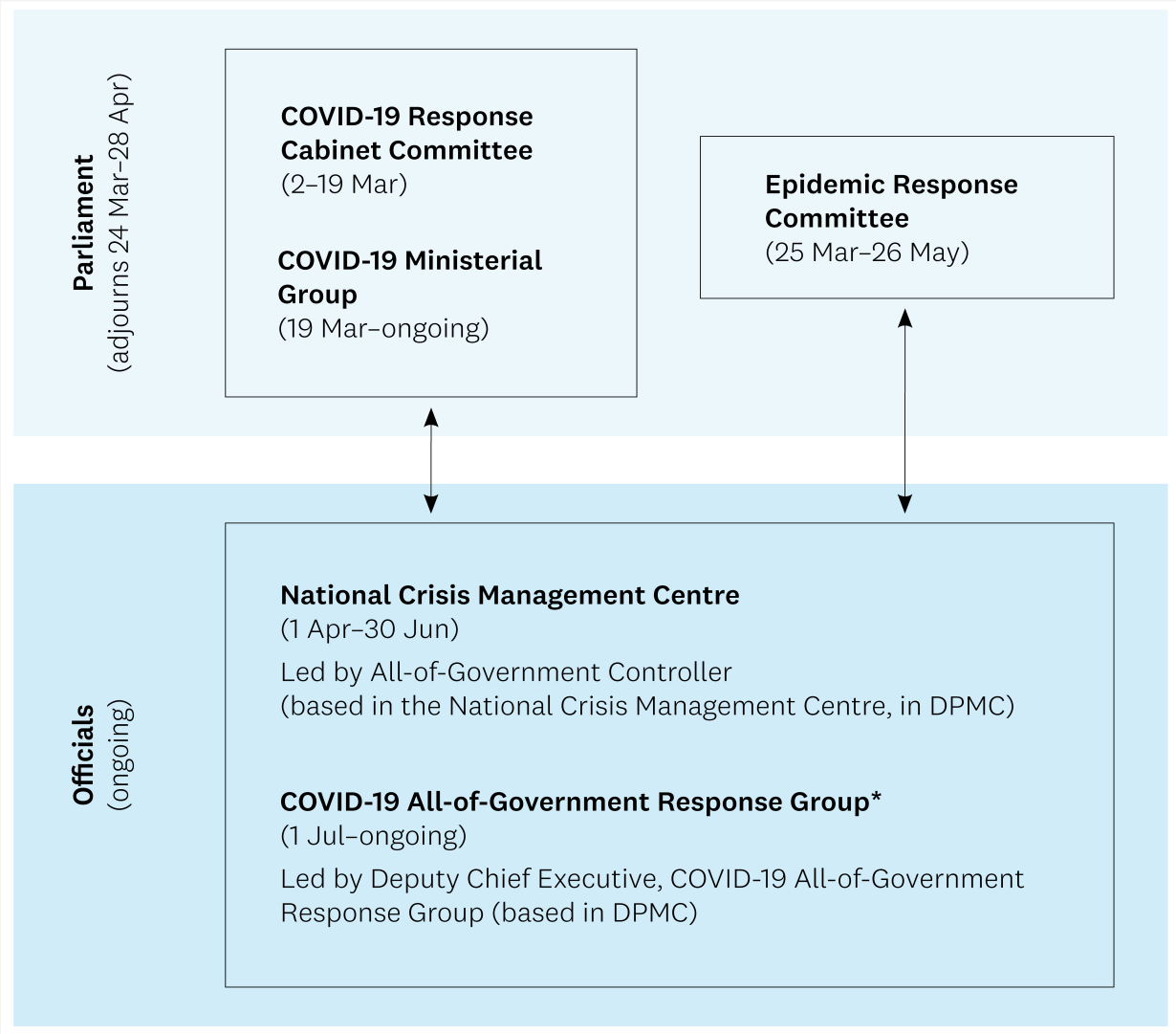
One of the most important documents in the collection is the 2013 *National Health Emergency Plan: National Reserve Supplies Management and Usage Policies*. This sets out New Zealand's pandemic stock and how it is to be distributed during an epidemic, pandemic or other emergency. Its aim is to provide 'continued access to essential supplies during large or prolonged emergencies that generate unusual demands on normal health service stocks or supply chains'. The key phrase in this is 'continued access', as there have been numerous reports in the media and concerns raised that this has not been the case; implying that somewhere there has been a breakdown either in stocks held or logistics in getting product from MoH and DHBs to frontline health workers.

The four pandemics in the last century (mentioned above) were all types of influenza. They all come from one family of viruses: technically known as A(H1N1), A(H5N2), A(H3N2) and A(H1N1) respectively. In contrast, COVID-19 is a disease generated by a human coronavirus. **Importantly, human coronaviruses have only been around since the 1960s; before that time coronaviruses were only found in animals.**

What is concerning is that two smaller human coronavirus outbreaks have occurred over the last 17 years: the 2003 Severe Acute Respiratory Syndrome (SARS) (technically called SARSCoV) and the 2012 Middle East Respiratory Syndrome (MERS) (technically called MERS-CoV). **The COVID-19 pandemic is therefore the third significant human coronavirus outbreak in just under two decades.**

# Aotearoa New Zealand's non-partisan approach to COVID-19

25 March 2020



# What can we improve?

June 2021

## The gap between doses matters!

Think Piece 37: June 2021



### Wendy McGuinness

Wendy has a BCom (UoA) and MBA (UO). She has attended short executive courses at Harvard (strategy), LSE (behavioural economics and macroeconomics) and with Nassim Nicholas Taleb (risk).

This think piece explains why our current vaccination strategy delivers poor value to New Zealanders over the long term.

In a recent article published in Singapore,<sup>1</sup> the authors identified four key components to getting life back to normal: vaccination, testing, treatment and social responsibility. While the article focused on Singapore, the same key components are applicable to New Zealand.

Over the past few weeks there have been growing concerns in the media about New Zealand's slow vaccine rollout. This included a comment in the OECD's May 2021 Economic Outlook that: '[t]he pace of vaccination needs to accelerate to reduce the risks of new outbreaks and pave the way for full border reopening in 2022'.<sup>2</sup> This point was not lost on ACT leader David Seymour, who noted:

After saying we would be at the front of the queue, New Zealand is now officially last in the OECD for the vaccine rollout ... According to "Our World in Data" [see Figure 1] New Zealand has fewer vaccinations per person than any other country in the OECD.<sup>3</sup>

New Zealand's first COVID-19 vaccination occurred five weeks after the UK's first vaccination, on 19 January 2021, but six months later, the difference between rollouts is stark.<sup>4,5</sup> See Figures 2 and 3.

Kim Hill interviewed UK scientist Dr Chris Smith on 26 June 2021 on RNZ.<sup>6</sup> Smith explained that what saved the UK was a strategy which focused primarily on getting one dose in the arms of as many citizens as possible. The goal was to follow up with a second dose later (when supply ramped up, approximately two to three months later).<sup>7</sup>

This approach has recently been shown to provide a second benefit: that, as suspected in December 2020, the bigger the gap between vaccinations, the better the immune response. Smith said they found '12 weeks was de rigueur';<sup>8</sup> a 12-week gap delivered the most robust, durable and resilient immune response.

Having a 12-week gap between doses would not only make it possible for New Zealand to rollout the vaccination to more people, but most importantly, would deliver more durable long-term protection. That is the message from the UK rollout - a 12-week gap will ensure New Zealand is in the best position to live with emerging COVID-19 variants for years to come.

On 31 December 2020 (updated on 26 January 2021), the UK's Joint Committee on Vaccination and Immunisation (JCVI) reported that:

- Short-term vaccine efficacy from the first dose of the Pfizer-BioNTech vaccine is calculated at around 90%
- Given the high level of protection afforded by the first dose, models suggest that initially vaccinating a greater number of people with a single dose will prevent more deaths and hospitalisations than vaccinating a smaller number of people with 2 doses
- The second dose is still important to provide longer lasting protection and is expected to be as or more effective when delivered at an interval of 12 weeks from the first dose.<sup>9</sup>

The report concluded:

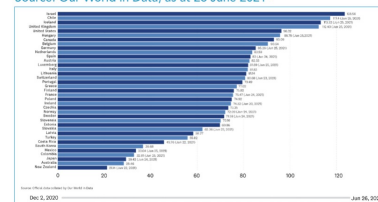
JCVI advises a maximum interval between the first and second doses of 12 weeks for both vaccines. It can be assumed that protection from the first dose will wane in the medium term, and the second dose will still be required to provide more durable protection. The committee advises initially prioritising delivery of the first vaccine dose as this is highly likely to have a greater public health impact in the short term and reduce the number of preventable deaths from COVID-19.<sup>10</sup>

The June 2021 guidance from Public Health England states:

An interval of 28 days may be observed when rapid protection is required (for example for those about to receive immunosuppressive treatment). It may also be recommended that the interval between the two doses be shortened to less than 12 weeks in periods of high or increased disease incidence ... Evidence shows that delaying the second dose to 12 weeks after the first improves the boosting effect. Data from clinical trials shows that the efficacy of the AstraZeneca vaccine was higher when the second dose was given at, or after 12 weeks and a recent study of people aged over 80 years found that extending the second dose interval to 12 weeks for the Pfizer BioNTech vaccine markedly increased the peak spike-specific antibody response by three and a half times compared to those who had their second vaccine at three weeks.<sup>11</sup>

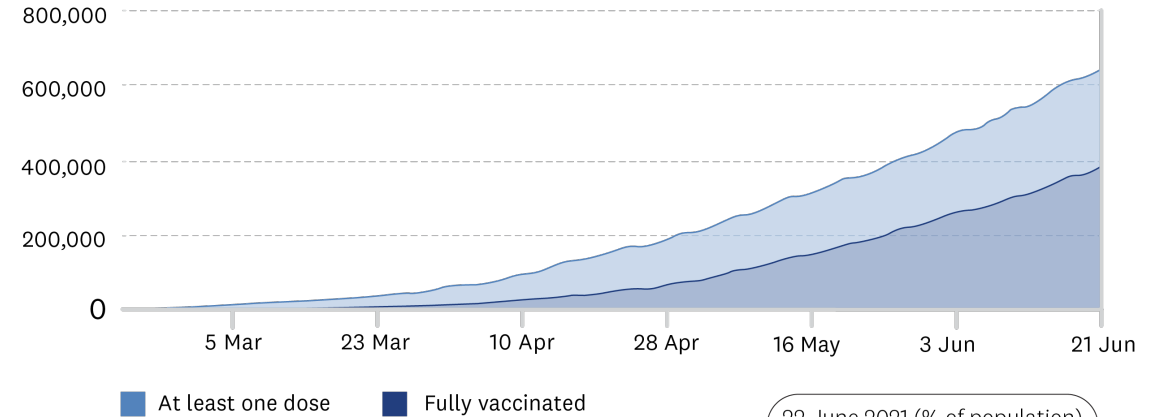
Figure 1: Vaccine doses administered per 100 people

Source: Our World in Data, as at 26 June 2021<sup>12</sup>



McGuinness Institute | Think Piece 37

Figure 2: NZ COVID-19 vaccinations



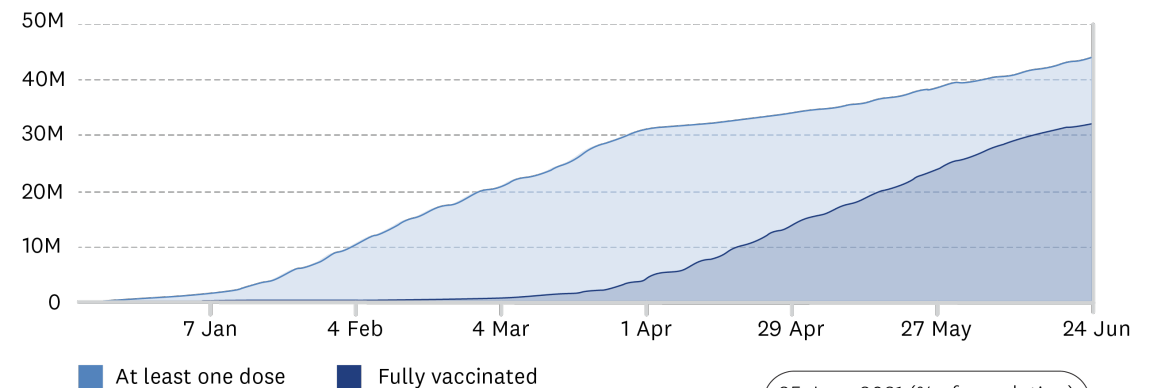
■ At least one dose ■ Fully vaccinated

Sourced from Our World in Data: New Zealand

22 June 2021 (% of population)

At least one dose: 13%  
Fully vaccinated: 7.8%

Figure 3: UK COVID-19 vaccinations



■ At least one dose ■ Fully vaccinated

Sourced from Our World in Data: United Kingdom

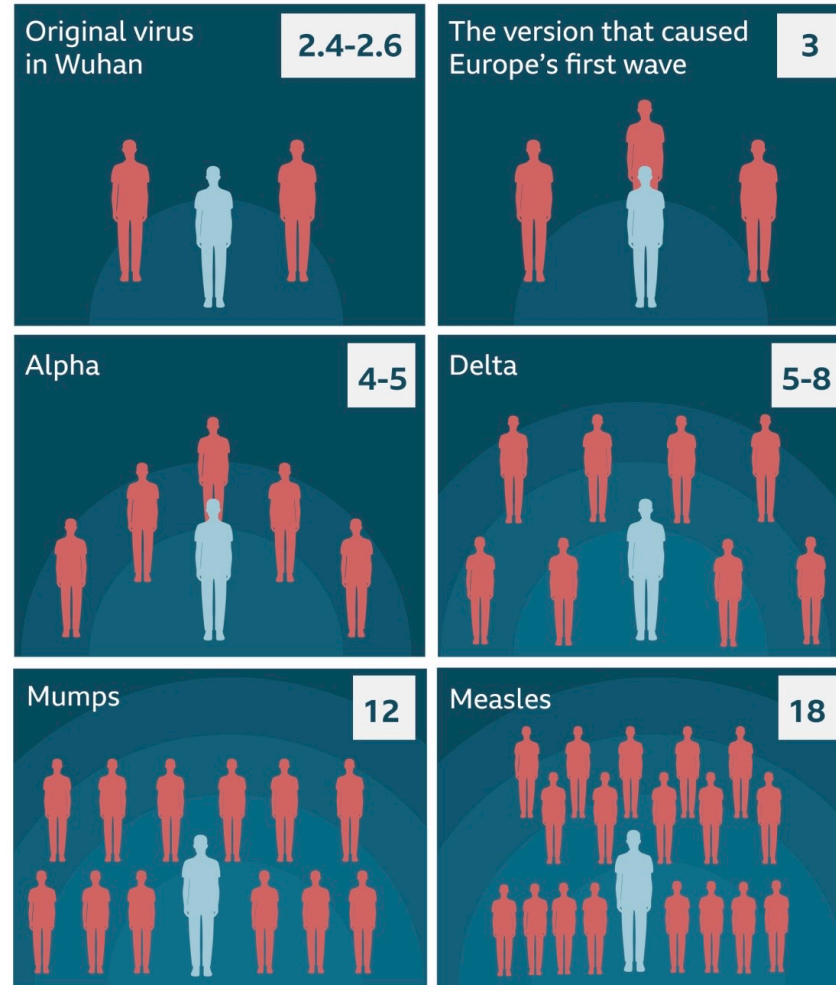
25 June 2021 (% of population)

At least one dose: 66.1%  
Fully vaccinated: 48.4%

# What is to come? From Delta to Zeta

## How the R0 numbers of Covid-19 variants and other diseases compare

The more contagious, the higher the R0 number



Source: Imperial College, Lancet, Australian government

BBC



# The importance of framing decision-making

Minister Shaw launching the principles for guiding the Emissions Reduction Plan



# Emergency 2: Climate change – the long emergency

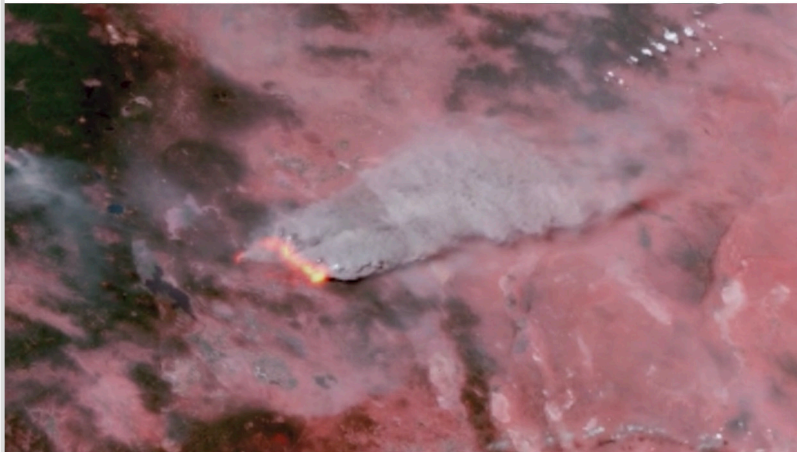


ALEXANDER von HUMBOLDT (1769-1859) diagram of Chimborazo showing his formulation of Naturgemälde from his The Geography of Plants, 1807



## *How Bad Is the Bootleg Fire? It's Generating Its Own Weather.*

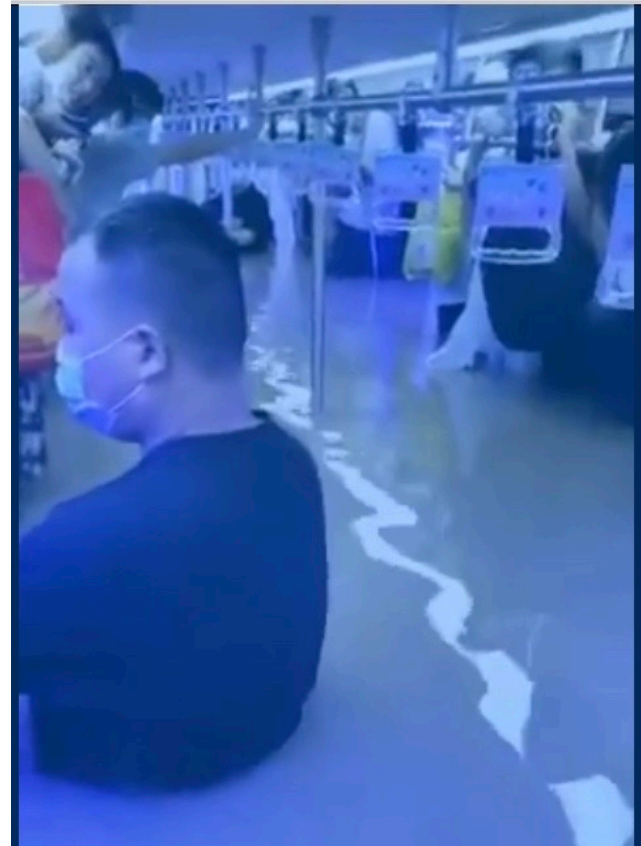
Unpredictable winds, fire clouds that spawn lightning, and flames that leap over firebreaks are confounding efforts to fight the blaze, which is sweeping through southern Oregon.



A satellite view of the Bootleg Fire burning in Oregon last week.

New York Times, 21 July 2021

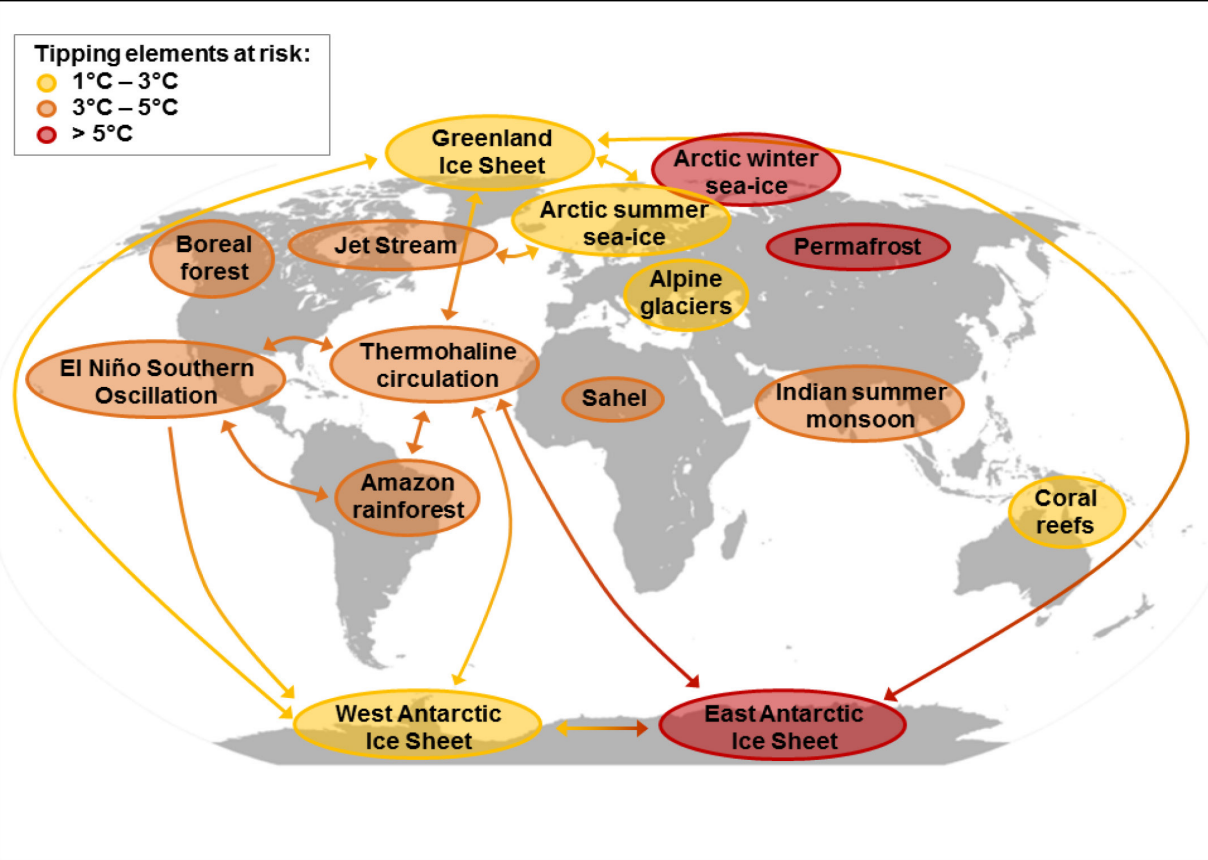
地铁全线网车站已暂停运营，工作人员正在救援。



BBC on 21 July 2021 (fast flooding, people tapped in train in China)



# Tipping Cascades



Source: J. Donges and R. Winkelmann  
in Steffen et al. 2018

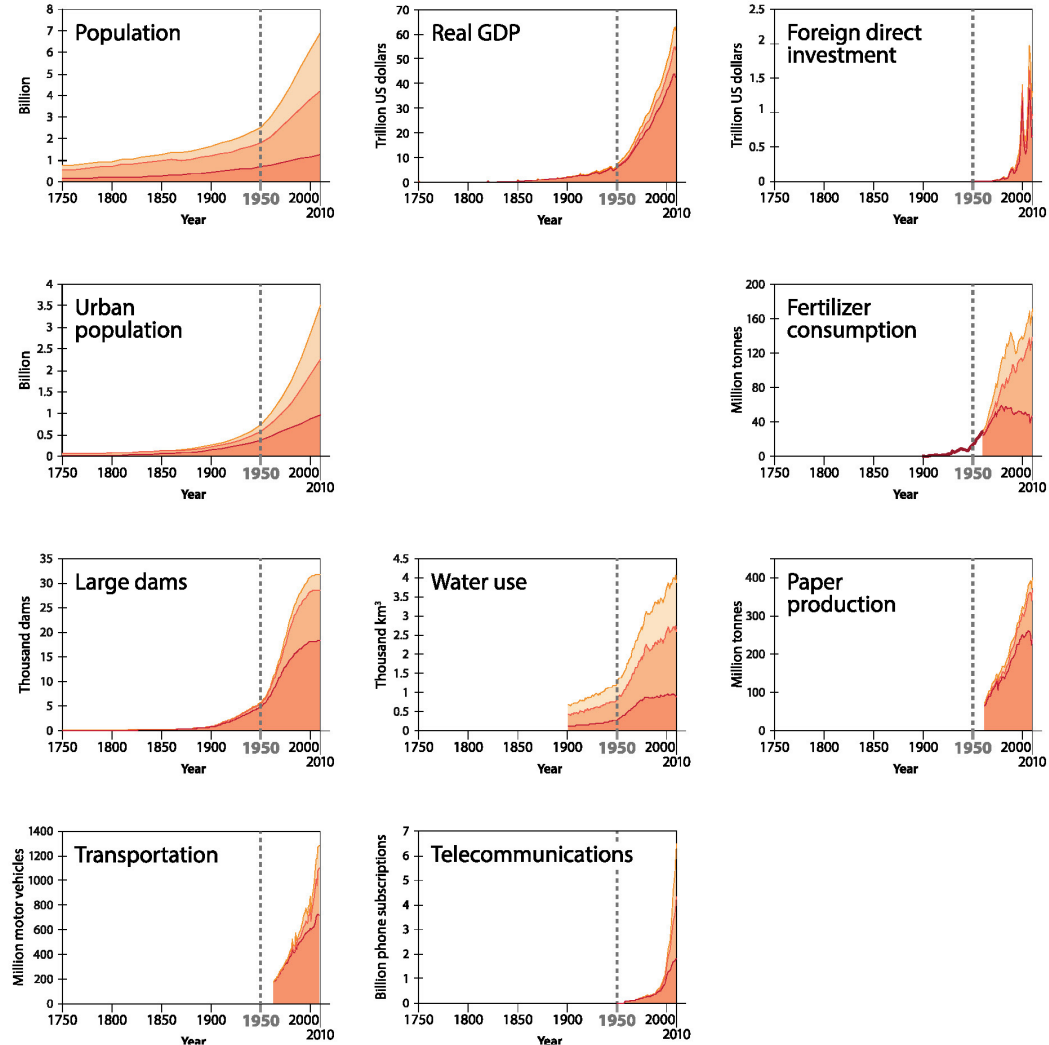


# Equity Issues

- Population
- Economic growth
- Fertilizer use
- Urbanization
- Globalization
- Transport
- Communication

## Socio-economic trends

OECD BRICS Others

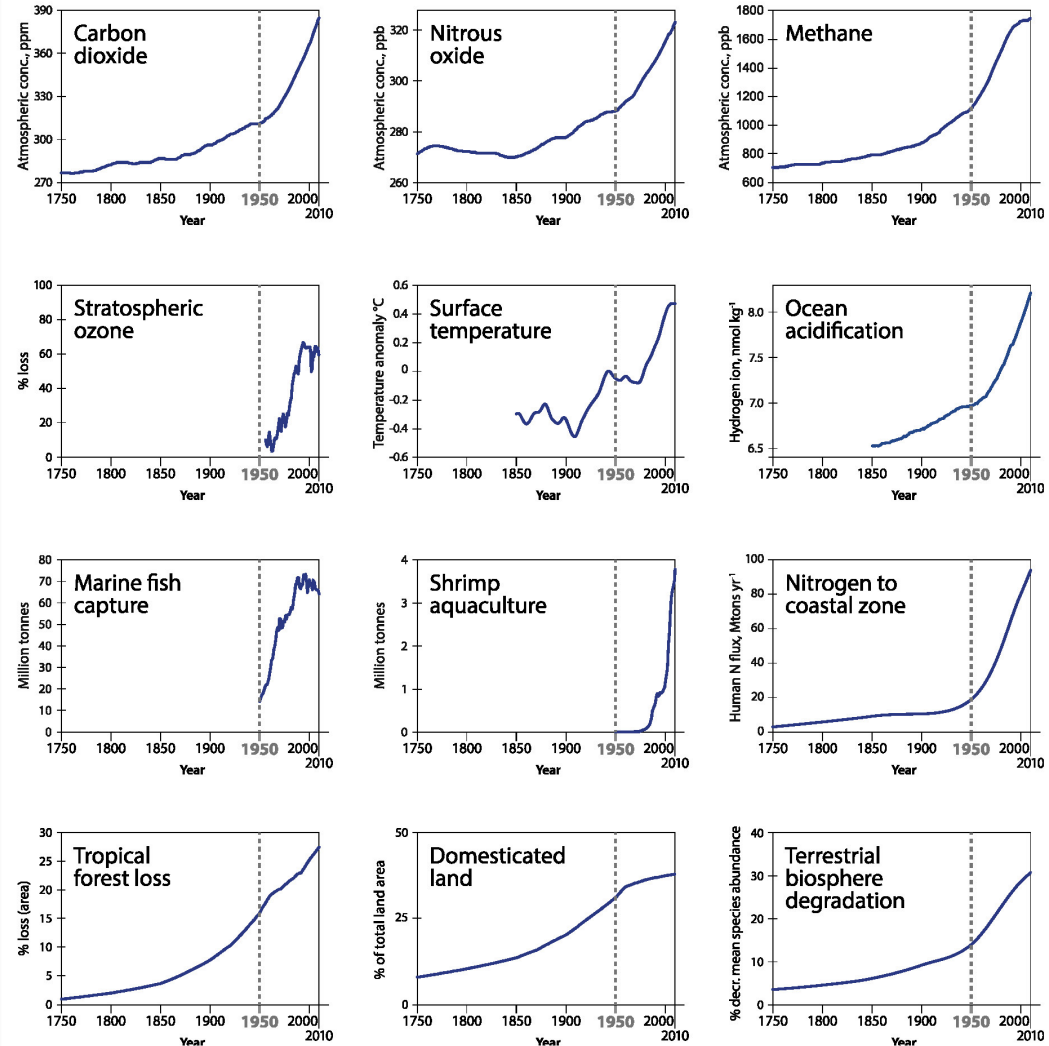


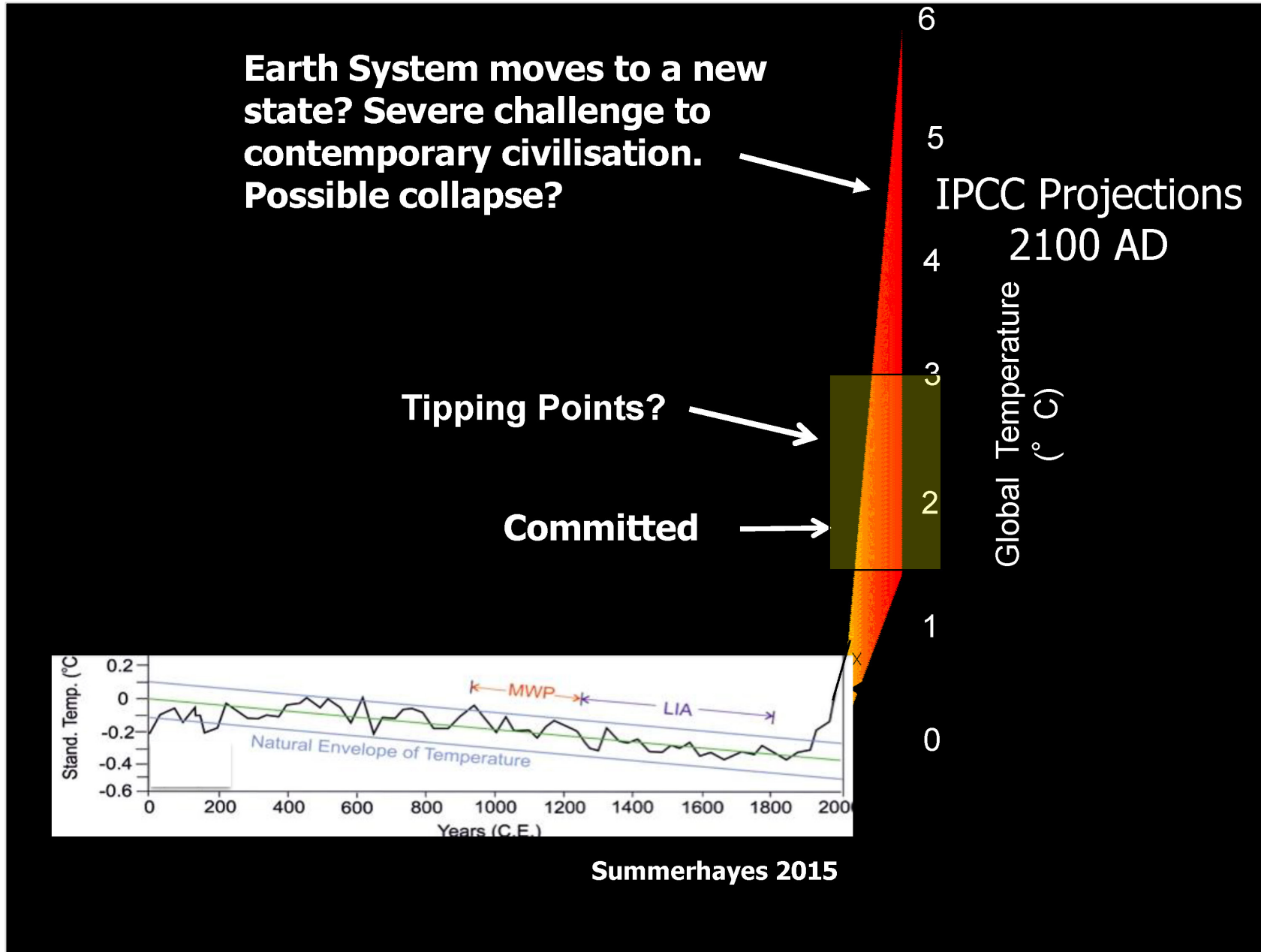
# The Great Acceleration

## Global Impact

- Greenhouse gases
- Ozone depletion
- Climate
- Marine ecosystems
- Coastal zone
- Nitrogen cycle
- Tropical forests
- Land systems
- Biosphere integrity

### Earth system trends





# TCFD 'strategy' exercise

## Resources:

A brief overview for each of the three climate scenarios that we will be using for this exercise. These scenarios are based on three IPCC RCP\* trajectories: RCP 2.6, RCP 6.0 and RCP 8.6. Hard copies of New Zealand business strategies published in the public arena.

## Method:

### Task 1 (Worksheet 1): Exploring worlds

On the A2 sheet provided, redraw Figure 2. In each band within the circle list the opportunities (left) and risks (right) which arise from the three different scenarios. Use Resource 1 (scenario overviews) to become familiar with the characteristics of each scenario. [15 minutes]

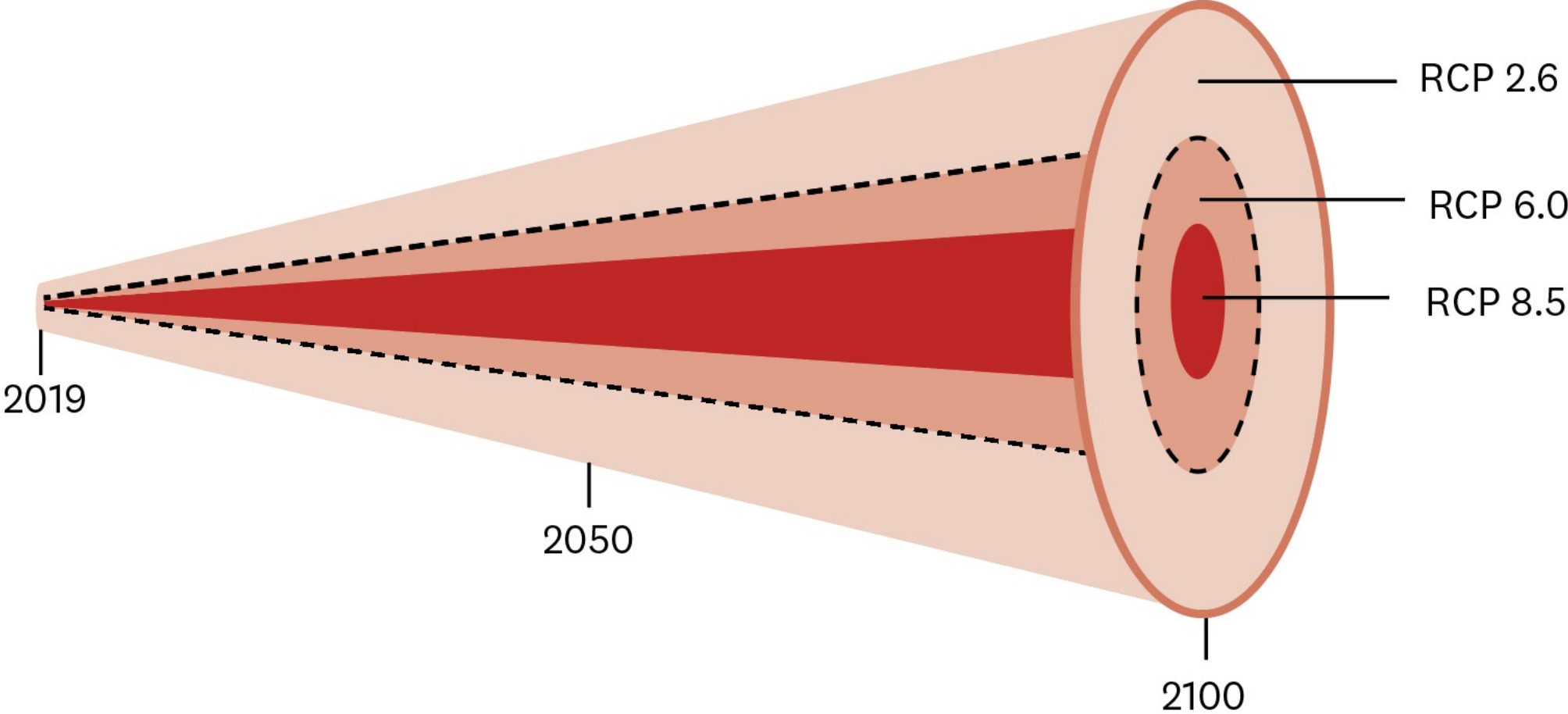
### Task 2 (Worksheet 2): Disclosures

Choose an industry from the ones provided (Resource 2). Become familiar with your chosen industry and then prepare a material disclosure which addresses points (a), (b) and (c). [15 minutes]

**Task 3:** Discuss and share observations with the rest of the group and then report back to the workshop. [30 minutes]

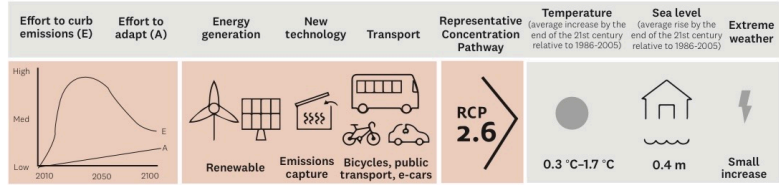


# Exercise: Trajectories as indicated in the Cone of Plausibility

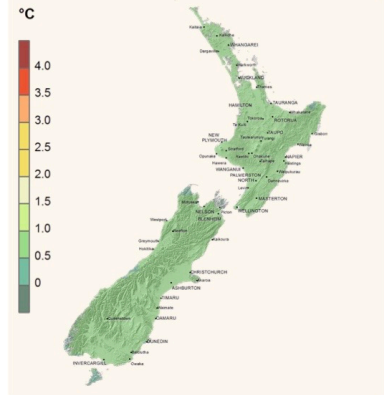


# Exercise (cont.)

## Resource 1: Brief Overview of Scenario RCP 2.6



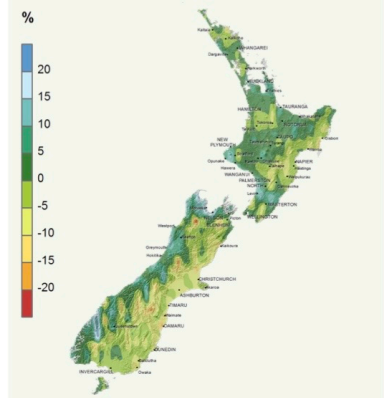
Temperature Change Between 1995 and 2055



Temperature Change Between 1995 and 2090



Rainfall Change Between 1995 and 2055



Rainfall Change Between 1995 and 2090

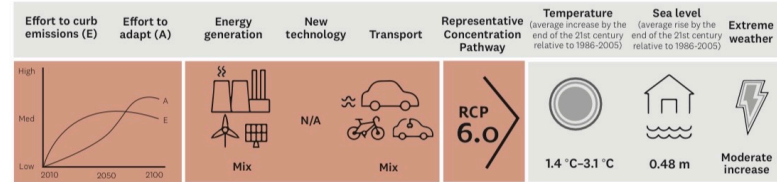


Note: The New Zealand maps (above) are from NIWA's NZ Climate Change Maps - which use data from the IPCC's Fifth Assessment Report (AR5) based on three representative concentration pathways (RCPs): RCP 2.6, RCP 6.0 and RCP 8.5. As explained on the additional information section of NIWA's Our Future Climate New Zealand website, RCPs provide an indication of the rate and amount of global greenhouse gas emissions over the coming decades. These projections use the climate model BCC-CSM1.1 and indicate the potential impacts of climate change in New Zealand. Our infographic has been inspired by CoastAdapt's Climate Change infographic.

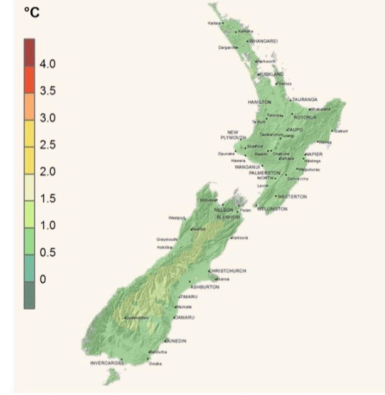
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## Resource 1: Brief Overview of Scenario RCP 6.0



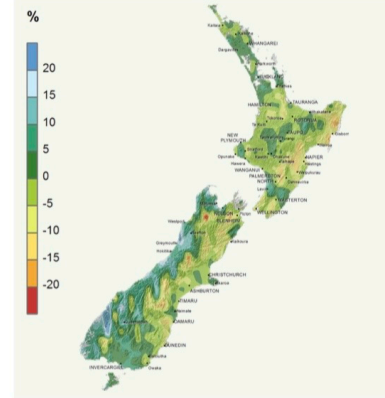
Temperature Change Between 1995 and 2055



Temperature Change Between 1995 and 2090



Rainfall Change Between 1995 and 2055



Rainfall Change Between 1995 and 2090

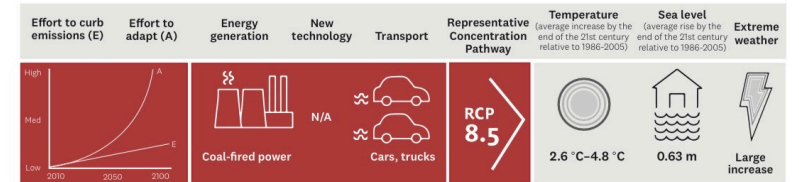


Note: The New Zealand maps (above) are from NIWA's NZ Climate Change Maps - which use data from the IPCC's Fifth Assessment Report (AR5) based on three representative concentration pathways (RCPs): RCP 2.6, RCP 6.0 and RCP 8.5. As explained on the additional information section of NIWA's Our Future Climate New Zealand website, RCPs provide an indication of the rate and amount of global greenhouse gas emissions over the coming decades. These projections use the climate model BCC-CSM1.1 and indicate the potential impacts of climate change in New Zealand. Our infographic has been inspired by CoastAdapt's Climate Change infographic.

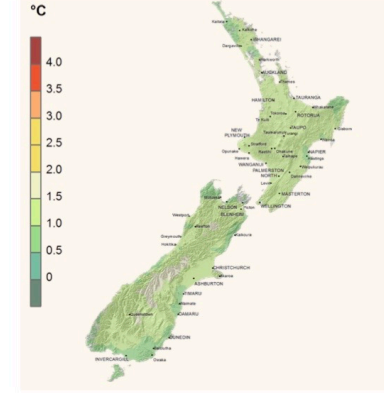
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## Resource 1: Brief Overview of Scenario RCP 8.5



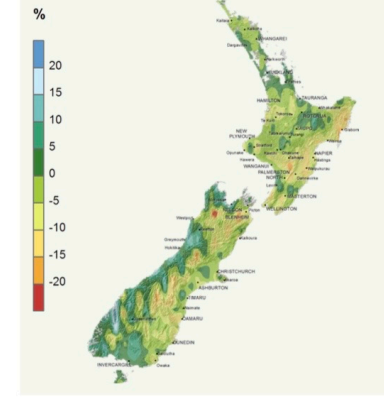
Temperature Change Between 1995 and 2055



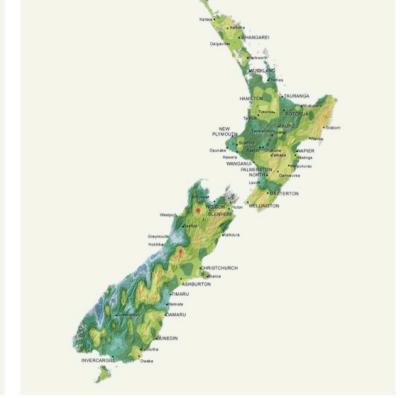
Temperature Change Between 1995 and 2090



Rainfall Change Between 1995 and 2055



Rainfall Change Between 1995 and 2090



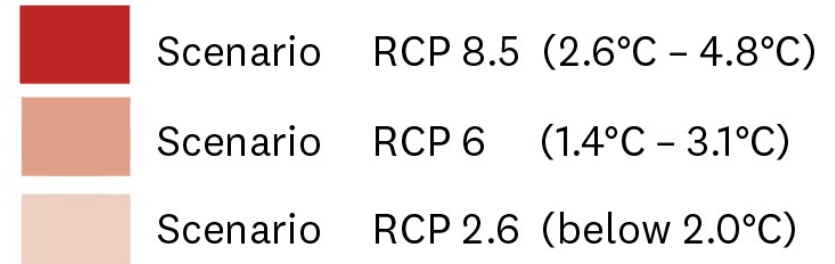
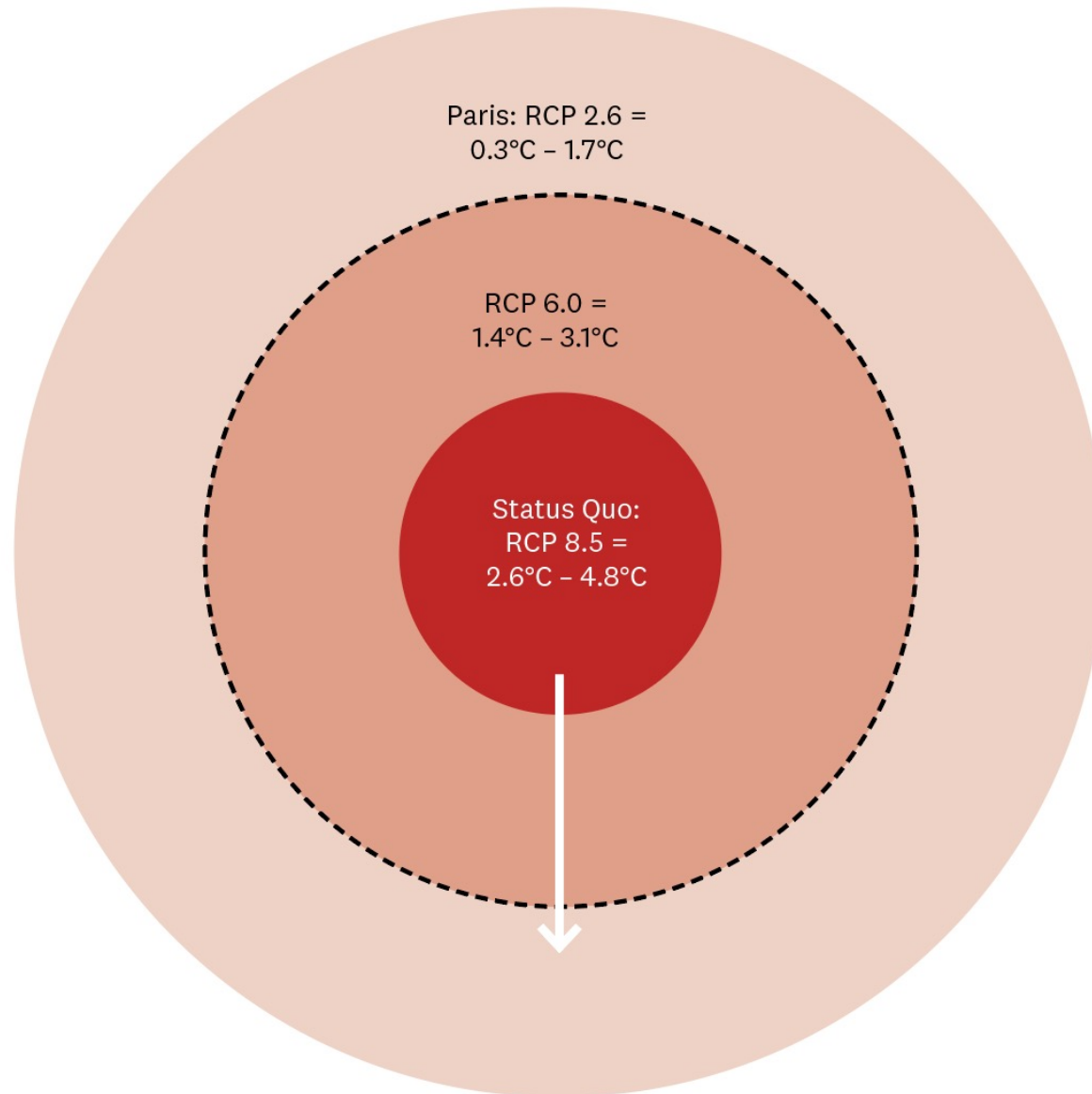
Note: The New Zealand maps (above) are from NIWA's NZ Climate Change Maps - which use data from the IPCC's Fifth Assessment Report (AR5) based on three representative concentration pathways (RCPs): RCP 2.6, RCP 6.0 and RCP 8.5. As explained on the additional information section of NIWA's Our Future Climate New Zealand website, RCPs provide an indication of the rate and amount of global greenhouse gas emissions over the coming decades. These projections use the climate model BCC-CSM1.1 and indicate the potential impacts of climate change in New Zealand. Our infographic has been inspired by CoastAdapt's Climate Change infographic.

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# Cone of Plausibility as at 2050



The white arrow indicates the general direction of the transition from the status quo to the Paris Agreement.



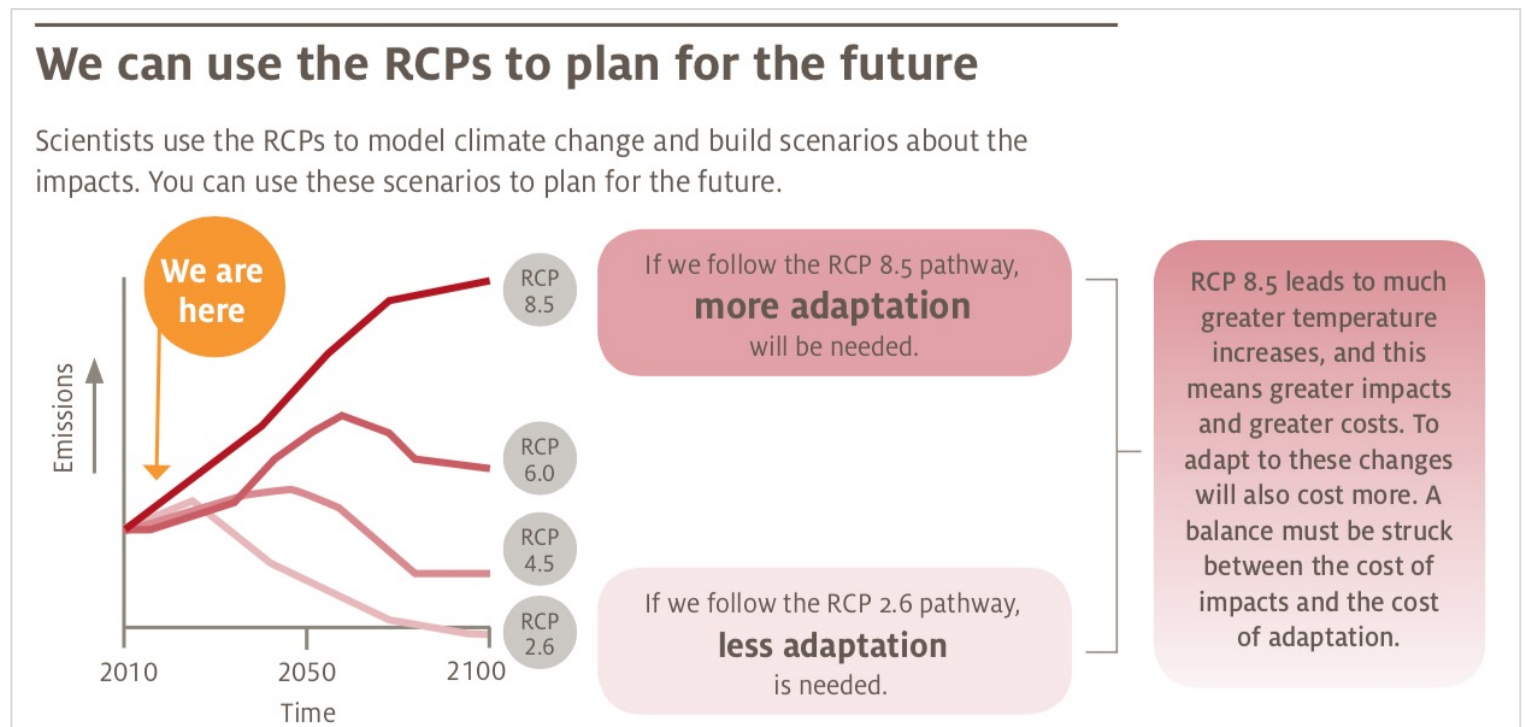
# RCPs

‘The name “representative concentration pathways” was chosen to emphasize the rationale behind their use. RCPs are referred to as pathways in order to emphasize that their primary purpose is to provide time-dependent projections of atmospheric greenhouse gas (GHG) concentrations’.

Source: IPCC Expert Meeting Report, Towards New Scenarios For Analysis Of Emissions, Climate Change, Impacts, And Response Strategies, IPCC 2007)

‘The goal of working with scenarios is not to predict the future but to better understand uncertainties and alternative futures, in order to consider how robust different decisions or options may be under a wide range of possible futures.’

Source: IPCC Scenario Process for AR5



# RCP primary characteristics

RCP 8.5 was developed using the MESSAGE model and the IIASA Integrated Assessment Framework by the International Institute for Applied Systems Analysis (IIASA), Austria. This RCP is characterized by increasing greenhouse gas emissions over time, representative of scenarios in the literature that lead to high greenhouse gas concentration levels (Riahi et al. 2007).

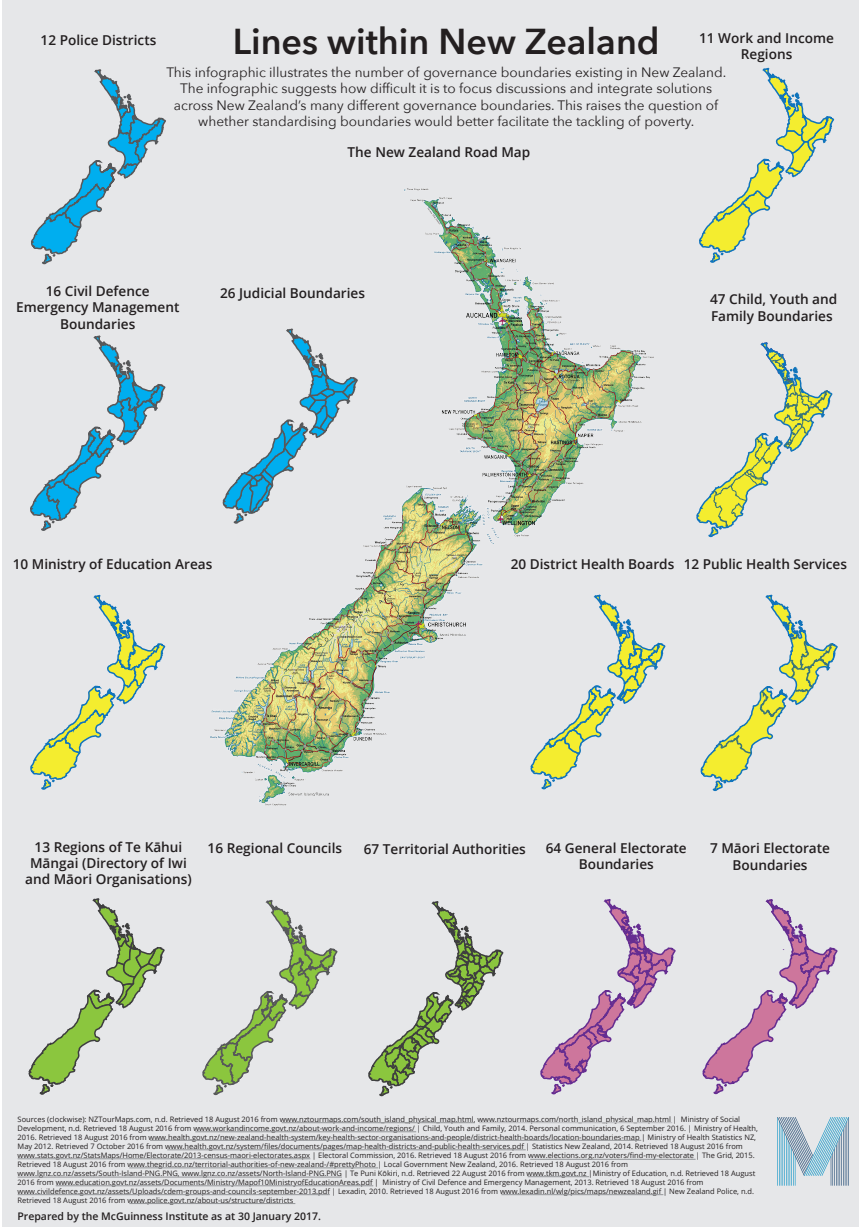
RCP6 was developed by the AIM modeling team at the National Institute for Environmental Studies (NIES) in Japan. It is a stabilization scenario in which total radiative forcing is stabilized shortly after 2100, without overshoot, by the application of a range of technologies and strategies for reducing greenhouse gas emissions (Fujino et al. 2006; Hijioka et al. 2008).

RCP 2.6 was developed by the IMAGE modeling team of the PBL Netherlands Environmental Assessment Agency. The emission pathway is representative of scenarios in the literature that lead to very low greenhouse gas concentration levels. It is a “peak-and-decline” scenario; its radiative forcing level first reaches a value of around 3.1 W/m<sup>2</sup> by mid-century, and returns to 2.6 W/m<sup>2</sup> by 2100. In order to reach such radiative forcing levels, greenhouse gas emissions (and indirectly emissions of air pollutants) are reduced substantially, over time (Van Vuuren et al. 2007a). (Characteristics quoted from van Vuuren et.al. 2011)



# The need for alignment going forward

Working Paper 2017/01



# The predominant approach and the mission approach

Rowan Conway, *Mission Aotearoa: Mapping our future*

Figure 1: The predominant approach

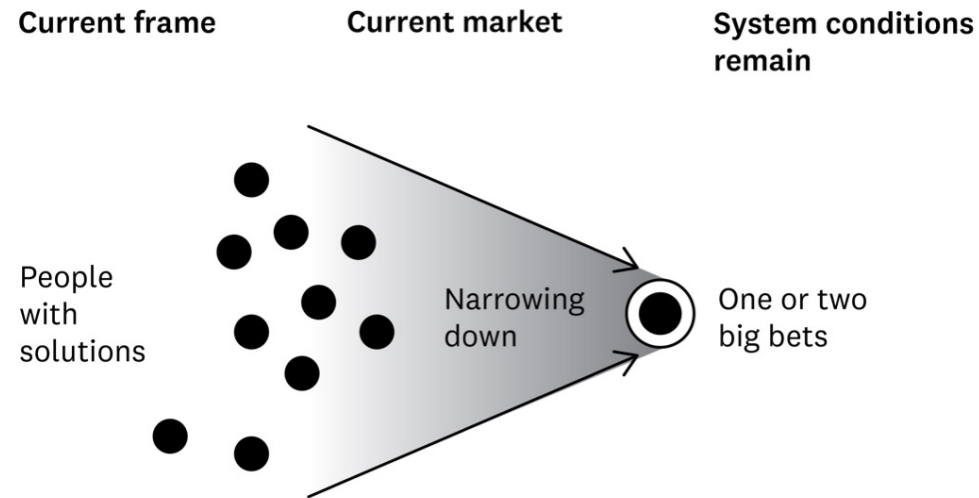
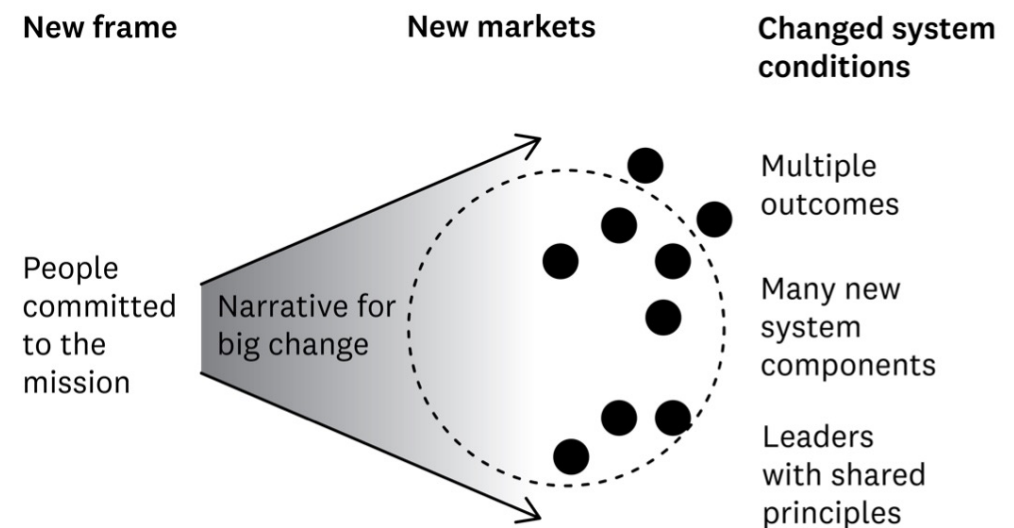


Figure 2: The mission approach



1 Conway, R., Leadbeater, C. & Winhall, J. (2019). *The Impact Entrepreneur: Building a New Platform for Economic Security in Work* (pp. 14–15). Royal Society for the Encouragement of Arts, Manufacture and Commerce. Retrieved 24 May 2021 from [www.thersa.org/reports/impact-entrepreneur-economic-security-work](http://www.thersa.org/reports/impact-entrepreneur-economic-security-work)

# References

## Slide 4:

The future of scientific thought

<https://www.tandfonline.com/doi/pdf/10.1080/03036758.2015.1013142>

## Slide 5:

The Global 2000 Report to the President

<https://www.cartercenter.org/resources/pdfs/pdf-archive/global2000reporttothepresident--enteringthe21stcentury-01011991.pdf>

## Slide 6:

Submission: He Pou a Rangi Climate Change Commission 2021 Draft Advice for Consultation

<https://www.mcguinnessinstitute.org/wp-content/uploads/2021/06/20210328-McGuinness-CCC-Submission-updated-cover.pdf>

## Slides 7 and 8:

Report 6 – Four Possible Futures for New Zealand in 2058

<https://www.mcguinnessinstitute.org/publications/project-2058/>

## Slide 9:

Stewart Brand, Paul Saffo – Pace Layers Thinking

<https://longnow.org/seminars/02015/jan/27/pace-layers-thinking/>

## Slide 10:

*Noise: A flaw in human judgement*

Cass Sunstein, Daniel Kahneman, and Olivier Sibony (2021)

## Slide 11:

Assumption mapping exercise

<https://www.mcguinnessinstitute.org/publications/worksheets/>

## Slide 13:

Linkages between projects

<https://www.mcguinnessinstitute.org/about/work/>

## Slide 14:

Report 6 – Four Possible Futures for New Zealand in 2058

<https://www.mcguinnessinstitute.org/publications/project-2058/>

Working Paper 2021/06:

<https://www.mcguinnessinstitute.org/publications/working-papers/>

## Slide 15:

NZ Accountants Journal (2005)

<https://www.mcguinnessinstitute.org/publications/articles/>

## Slide 16:

Pandemic Influenza Plan 2017 Update (p. 52)

<https://www.cdc.gov/flu/pandemic-resources/pdf/pan-flu-report-2017v2.pdf>

## Slide 17:

Distancing strategy: flattening the COVID-19 curve

<https://www.mcguinnessinstitute.org/publications/infographics/>



# References (cont.)

## Slide 18:

Think Piece 33

<https://www.mcguinnessinstitute.org/publications/think-pieces/>

## Slide 19:

[\*Nation Dates: Timelines of significant events that have shaped the history of Aotearoa New Zealand\* \(Fourth Edition, Dec 2020\)](#)  
(p. 324)

## Slide 20:

Think Piece 37

<https://www.mcguinnessinstitute.org/publications/think-pieces/>

## Slide 21:

Covid: Is there a limit to how much worse variants can get?

<https://www.bbc.com/news/health-57431420>

## Slide 22:

Principles for guiding the Emissions Reduction Plan

<https://www.beehive.govt.nz/speech/it-falls-us-principles-guiding-emissions-reduction-plan>

## Slide 23:

ALEXANDER von HUMBOLDT (1769-1859) [diagram of Chimborazo showing his formulation of Naturgemälde from his The Geography of Plants, 1807](#)  
(Pictorial Press Ltd / Alamy Stock Photo)

## Slide 24:

How Bad Is the Bootleg Fire? It's Generating Its Own Weather

<https://www.nytimes.com/2021/07/19/climate/bootleg-wildfire-weather.html>

China floods: 12 dead in Zhengzhou train and thousands evacuated in Henan

<https://www.bbc.com/news/world-asia-china-57861067>

## Slides 25, 26, 27 and 28:

The Anthropocene: Global Change and the Earth System (Will Steffan)

<https://www.mcguinnessinstitute.org/publications/presentations/>

## Slides 29, 30, 31 and 32:

TCFD Strategy Exercise:

<https://www.mcguinnessinstitute.org/publications/worksheets/>

## Slides 33 and 34:

The Beginner's Guide to Representative Concentration Pathways

[https://skepticalscience.com/docs/RCP\\_Guide.pdf](https://skepticalscience.com/docs/RCP_Guide.pdf)

## Slide 35:

Working Paper 2017/01 (Appendix 6)

<https://www.mcguinnessinstitute.org/publications/working-papers/>

## Slide 36:

Mission Aotearoa: Mapping our future (p. 8)

<https://www.mcguinnessinstitute.org/publications/discussion-papers/>



Thank you  
Ngā mihi

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