Preparing for the future
Prediction, foresight, and strategy

Charlie Nelson

director foreseechange
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foreseechange

www.foreseechange.com
charlie@foreseechange.com

I have often heard business executives say that they just want certainty. Usually this is in regard to government policy, but there can be no certainty as 2020 demonstrated. The shocks included extensive, tragic bushfires, the COVID-19 pandemic, an economic recession, and electoral mayhem in our most important ally, USA. Government policy about debt and deficit did a complete U-turn.

When business executives are confronted by increased uncertainty, many seek to cut costs – both operational and marketing – which is usually not an optimum strategy.

We seem to experience major shocks about once a decade and there are smaller unexpected disruptions more frequently. I have listed the major such events that I can remember in Appendix 1. As in 2020 there are times when we need to cope with more than one disruptive factor. Other potential catastrophes and their impacts are listed in Appendix 2.

Can we predict shocks such as these, and so prepare? If not, how can we survive such shocks? Why do some companies get stronger during a period of uncertainty? Before addressing these questions, it important to consider the types of uncertainty that we may encounter.

Types of uncertainty

Reports that say there's -- that something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things that we know that we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns, the ones we don't know we don't know.

This was Donald Rumsfeld (then US Defense Secretary) in February 2002, speaking about the lack of evidence linking the government of Iraq with the (assumed) supply of weapons of mass destruction to terrorist groups.

It ain't what you don't know that gets you into trouble. It's what you know for sure that just ain't so.

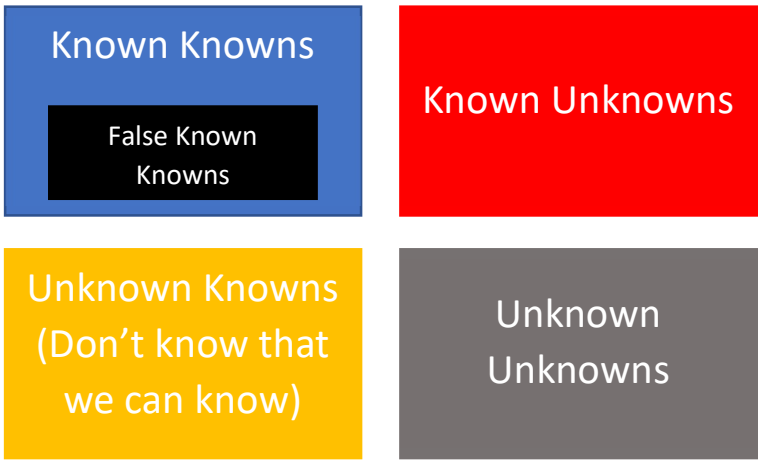
Mark Twain

It is a shame that Donald Rumsfeld was not more familiar with Mark Twain's writing as he may have realised that there are two types of known knowns. One is true known knowns and the other is fallacious known knowns. The latter often stems from a false assumption or theory that has become a strong belief.

A Johari Window depicts what Rumsfeld was trying to say. It was developed in the 1950's by psychologists Joseph Luft and Harrington Ingham to help people understand their relationship with themselves and others. This has been adapted for application to foresight.

The fourth window, which was not mentioned by Rumsfeld, represents information which can be known but we are not aware that is knowable. In some cases we may not want to know due to psychological avoidance – sidestepping facts so as to avert painful conflict with others or within oneself. Climate change is an example. Some people believe that the climate is not changing, or if it is that the change is due to natural causes rather than human activity. This is despite the abundant empirical and theoretical evidence that human activity is causing climate change.

I have adapted this adaption by adding another window, which is opaque, to depict the false known knowns. We should always question the reliability of what we know for sure.



An example of a false known known is the cause of stomach ulcers. The conventional wisdom in the medical fraternity was that they were caused by stress. When Australian physician Barry Marshall discovered in 1982 that a chronic infection causes stomach ulcers, he was ostracised by the medical community for a decade. Physicians used to treat chronic stomach ulcers by cutting out the lower third of the stomach, but when Marshall's research was finally accepted simply applying antibiotics cured them. It is a remarkable story, which is summarised in Appendix 3.

Foresight strategies exist for each of the Widows. What may be considered Known Knowns need to be questioned to ensure that our assumptions are valid. Scanning is an important strategy for identifying what is known, but hidden from us. Here we must question our own beliefs to ensure that information is not repressed. Scenarios and sensitivity analysis are important in dealing with Known Unknowns. Imagination and fiction can help reveal Unknown Unknowns.

Economist Frank Knight, in 1921, defined risk as a quantity which can be measured while uncertainty is not measurable. That is, we can compute the likelihood of a risk event occurring in a given year (perhaps on the basis of past frequency of occurrence) but uncertainty does not have a known probability distribution.

There may be some factors or events which are impossible to imagine and so these are **completely uncertain**. This is most likely because they have never happened before. They are the "Black Swans" of Nassim Nicholas Taleb or the unknown unknowns of Donald Rumsfeld. Taleb, in his

books *Fooled by Randomness* and *The Black Swan*, describes Black Swan events as having three characteristics. The first is that nothing in the past could have convincingly pointed to its possibility. Secondly, the event has an extreme impact. Third, in spite of its outlier status, human nature makes us concoct explanations for its occurrence after the event – retrospectively making it appear to have been predictable even though it wasn't predicted. Technological developments can be Black Swans when it comes to long-term forecasting – for example, it would have been very difficult for someone in 1945 to imagine that in less than 60 years there would be cheap, very small and powerful personal computers with high bandwidth links to billions of others.

There are some events which we know can happen but we don't know where or when and how severe their impact could be. These include extreme weather events (such as hurricane Katrina) and other natural events such as volcanic eruptions, earthquakes, tsunamis, large solar flares, collisions with large meteors or comets. Then there are disease pandemics and terrorist acts. While these are **highly uncertain**, we know they can happen and may be able to take some precautions – such is improving the levee banks for New Orleans, constructing resilient buildings in earthquake prone areas, developing tsunami and volcanic eruption warning systems, and developing new medicines.

Financial markets and consumer markets can also suffer from events which we know can happen, but we can't predict their timing or likely severity.

Then there are changes which are slow moving and there is little uncertainty about their impact – and yet we take little or no action to capitalise on them or to mitigate them. The only uncertainty is when we will act. These are global long-term trends, sometimes referred to as megatrends. Examples of this type of change are provided in Appendix 4.

Can we predict shocks and so prepare for them?

Yes, we can predict some types of shock and we can have some idea of their likelihood. The following is from the editorial of The Australian Financial Review of 4 July 2011.

Imagine this. The year is 2017 and a virulent strain of H5N1 avian flu has jumped from poultry to humans in the crowded southern Chinese city of Guangzhou. The virus quickly spreads across the porous border into Hong Kong, then sweeps rapidly through the rest of Asia. The World Health Organisation declares the outbreak a pandemic as governments around the globe break open their vaccine stockpiles in an effort to protect their citizens from the deadly virus. But the measures taken by health authorities do little to stop the spread of the virus. The pandemic ends up killing more than 50 million people around the world, transport and trade systems grind to a halt, and the global economy tips into a recession more severe than that caused by the financial crisis of 2008-10.

The 2020 pandemic occurred just three years after the year posited in this scenario. It was not avian flu, but a corona virus – although it did transmit from an animal and probably started in China. As at 1 June 2021, nearly 4 million people have died according to official figures, but the estimated death toll is likely to be 10 million (The Economist, 15 May 2021). 171 million are known to have been infected. The current global recession is indeed more severe than that of the financial crisis of 2008-10.

The scenario cited by the Financial Review was from an OECD report at the time, which identified and described several other potential shocks.

The current pandemic has been described by some as a one in a hundred year event by reference to the so-called Spanish flu of 2018. It is not! There was a deadly flu pandemic in 1957-58 which killed more than a million people worldwide (Asian flu). The Hong Kong flu pandemic of 1968 also killed more than one million. In the previous 17 years there have two earlier deadly corona viruses – SARS (severe acute respiratory syndrome) in 2003 and MERS (middle east respiratory syndrome) in 2012. They petered out, but should have served as a warning.

Despite these warnings we were unprepared for the pandemic. We did not have enough supplies of personal protective equipment, sanitiser, and hospital ventilators. There had been no pandemic rehearsal for over a decade.

Managing uncertainty means that we should treat how we managed this pandemic as a dress rehearsal and learn from the experience. There will be another pandemic and it could be soon.

It was possible to predict a severe economic slowdown in 2008-09, but people in power at the time did not want to see the signals. In mid-2007, I was able to predict the slowdown in Australia and to warn my clients. I realised that three shocks could occur together in about mid-2008 and that the combined impact would be a significant slowdown. One was the sub-prime home loan boom in the USA, which was likely to slow their economy when the bubble burst. Another was the Reserve Bank of Australia's interest rate policy. They had been lifting interest rates since 2002 in an effort to quell inflation. I knew they would go too far and so they did, lifting interest rates in August and November 2007 and in February and March 2008. By the end of 2004, the proportion of household disposable income which was consumed by interest payments exceeded the 9.7% record set on the eve of the recession of the early 1990's. By mid-2007, the burden was 11.7% and yet the Reserve Bank piled on the misery, lifting the burden to 13.3% on the eve of the GFC! They obviously did not see it coming. The third predictable impact was associated with the Beijing Olympics in August 2008. I had visited Beijing in April 2007 and witnessed the huge construction boom as the whole city was reconstructed – not just sporting facilities. A metro with 500 underground stations, whole villages demolished and replaced with apartment towers – all built using steel made from Australia's iron ore! It had to come to a shuddering halt before mid-2008.

The Reserve Bank of Australia did not see the GFC coming, but they were not alone in that.

Legendary US Federal Reserve Chairman Alan Greenspan said in 2008 "I made a mistake in presuming that the self-interests of organisations, specifically banks and others, were such that they were best capable of protecting their own shareholders and their equity in the firms". He regretted his earlier opposition to regulatory curbs on financial derivatives which left banks facing billions of dollars worth of liabilities.

The danger signs for Australia were there as I have described above, but the experts in charge of monetary policy and financial regulation were oblivious to them. It was an Unknown Known! All it took was good general knowledge and imagination to develop the scenario. Both of these skills are important in anticipating shocks.

The 2019-20 bushfires were of unprecedented ferocity, but they were predicted long in advance (see Appendix 5). Adequate preparation was lacking, despite the accurate predictions.

Preparing for uncertainty

We can prepare for uncertainty by using foresight technique, such as scenarios and peripheral vision.

Scenarios are plausible futures, like those described above for a pandemic and a significant economic slowdown. They must be accompanied by plans for managing should they eventuate. Developing a set of scenarios can increase resilience. The aim is to develop plans which can succeed across a range of scenarios. We do not attach a likelihood to each scenario because we are dealing with uncertainty but we may be able to discern which scenario is most likely as time goes on, based on a range of indicators.

Peter Schwartz wrote the early guide to scenario development, "The art of the long view" (Currency Doubleday, 1991). He lists eight steps in the development of scenarios:

1. Identify the focal point or key decision. This will increase the relevance of the scenarios.
2. Identify the key factors – what will the decision makers need to know when making choices?
3. List the driving forces that influence the key factors.
4. Rank the driving forces by their levels of importance and uncertainty. This will focus the analysis on issues which are both highly important and uncertain.
5. Select scenario logics – a diverse set of plots spanning the range of plausible outcomes.
6. Fleshing out the scenarios – develop the narratives associated with each scenario.
7. Implications for each scenario – what are the opportunities and vulnerabilities revealed by the scenarios and how should strategy be adapted?
8. Selection of leading indicators and signposts – which can reveal, as time progresses, which scenario is closest to the course of events as they unfold.

The intended outcome is plans which are robust across a wide range of uncertainty. The individual scenarios should be rehearsed so that implementation of strategy adaptation is smooth and efficient.

Peripheral vision

The biggest dangers to a company are the ones you don't see coming. Understanding these threats – and anticipating opportunities – requires strong peripheral vision.
George S Day and J. H. Schoemaker in "Scanning the Periphery", Harvard Business Review, November 2005.

Scanning the periphery is all about answering the question "what don't we know that might matter". Often management reports are quite internally focused – on the business and the market in which they operate. But demographic change, technological change, regulatory change, environmental change, amongst others, can cause major disruptions to a business which are not anticipated.

Peripheral vision involves scanning the broad business and social environments for weak signals of potential change and analysing the implications. This should be a continuous process. Unfortunately, this activity can be seen as "nice to know" rather than "need to know" and investment in it can be seen as discretionary. The global financial crisis which emerged in 2008 was not predicted by economists primarily because of groupthink and a failure of imagination. Perhaps they had not invested enough in scanning the periphery.

Scanning is sometimes referred to as STEEP analysis (Social, Technological, Economic, Environmental, Political) and also has other acronyms such as PESTEL. It is also described by some as Horizon Scanning.

Scanning the periphery differs from scenario analysis in an important way. Scenarios start with a focus on the key decisions to be made and then identifies and qualifies influential factors. Scanning starts with the broad business environment and then evaluates how future trends may influence the business. I recommend that both approaches be employed as they provide complementary insights, which increases preparedness.

Other foresight tools

Informed imagination is an important foresight tool. Sir Arthur C. Clarke's most famous prediction on the future is his proposal for geostationary satellite communications published in the Wireless World magazine in 1945. Not considered seriously at the time it became a reality within 20 years with the launching on April 6th 1965 of Intelsat I Early Bird the first commercial geostationary communication satellite. In Ascent to Orbit Clarke says the paper with original title The Future of World Communications was written in late June and submitted to the RAF censor on July 7th. It was sent to Wireless World on August 13th and accepted on September 1st. The editor had changed title to Extra-Terrestrial Relays and published it in the 1945 October issue of Wireless World (pages 305-308).

Arthur C. Clarke is best known as a prolific and popular science fiction writer. He collaborated with Stanley Kubrick in the writing of the 1968 movie 2001: A Space Odyssey, which was a development of Clarke's 1951 short story The Sentinel. His 1945 foresight was based on knowing the science of orbits and of the V2 rocket developed during World War 2 by Germany. He imagined further rocket development for the launch vehicle and imagined the development of communications technology for satellites.

Fiction can also be a foresight tool. A good example is Gorge Orwell's Nineteen Eighty Four, written in 1949. His depictions of totalitarianism and mass surveillance have come true in parts of the world. Also contained in the book are themes concerning the cult of personality and the Ministry of Truth, which changes facts to suit propaganda purposes – these have also been relevant in other parts of the world recently.

Risk analysis is a tool used to identify and assess factors that may jeopardize the success of a project or achieving a goal. This technique also helps to define preventive measures to reduce the probability of these factors from occurring and identify countermeasures to successfully deal with these constraints when they develop to avert possible negative impacts. There can also be opportunities arising from risk analysis.

The World Economic Forum (WEF) Risks Reports, prepared annually and released in January, can be used as a starting point for customised risk analysis. Some of the content of the 2021 WEF risk report are contained in Appendix 6.

How can we survive during a period of uncertainty?

Ideally, governments and organisations would have developed risk analysis and response scenarios which have been rehearsed. The current pandemic shows that this tends not to happen.

Some organisations lapse into pessimism and crisis mode. They cut costs across the board, including marketing, and so hand market share to more optimistic competitors. If the market is shrinking this is devastating and recovery is very difficult.

A study published by Harvard Business Review in March 2010 analysed business responses during the three previous recessions to identify the most successful strategies. It was found that the best performing businesses cut costs mainly by improving operational efficiency rather than by slashing the number of employees. They also invested in growth. They developed new business opportunities by making significantly greater investments than their rivals in R&D and marketing, and they invested in assets such as plant and machinery to improve productivity.

During the current pandemic and recession governments and some businesses developed near real-time data so that strategy decisions were not based on out-of-date data. Fortnightly data from the Australian Tax Office on payrolls was used to gauge employment and payrolls, banks provided data on consumer spending via debit and credit card records, the Australian Bureau of Statistics and private agencies conducted more frequent surveys to measure the mood and expectations of consumers and business managers. Health departments provided daily updates on coronavirus infections. Mobility data was provided by Google and Apple.

This is also referred to as “fast data”. It is not only near real time, it is also more granular in respect to location, type of business and consumer demographic.

This regular flow of timely data allowed government economists, health officials, and businesses to adjust forecasts and strategy frequently – to be more agile.

Fast data is essential during periods of uncertainty and our experience in developing information systems over the past year and interpreting fast data will stand us in good stead for the next shock, when it comes.

Can we get stronger during a period of uncertainty?

Harvey Norman sales soared during the pandemic, and so did profits and dividends. Gerry Harvey said it was the best sales growth he had experienced in 60 years of being in retail. “It started off with freezers and then it went to whitegoods and computers, then to televisions and then to furniture and bedding. This performance was not by design, but was a consequence of working from home and compulsory cocooning during the pandemic. Harvey Norman took advantage by strong investment in advertising from the outset.

Other retailers to prosper during the recession have been JB Hi-Fi, Bunnings, Kogan.com, and Temple & Webster.

During the global financial crisis most major brands of vehicles cut advertising investment in Australia significantly – because they were pessimistic about recent and expected future new vehicle sales. One brand kept advertising and so significantly boosted share of voice and market share. They have held on to that extra share ever since while one of the big brands then, Holden, have now exited the market. That optimistic brand was Hyundai.

Nassim Nicholas Taleb, of Black Swan fame, recently wrote a book called Antifragile. The theme is that resilience is not the opposite of fragile. Something fragile breaks under stress, while something resilient does not: but something which is antifragile gets stronger under stress. Hyundai during the global financial crisis is a good example of antifragility.

These successes reinforce the findings described in the Harvard Business Review article mentioned above. Investment in growth during an economic slowdown, while also improving operational efficiency, is the best strategy for prospering during periods of uncertainty.

Key strategies for managing uncertainty

1. Anticipate. Use scenarios to construct a set of plausible futures complete with appropriate plans for each. Rehearse the plans and use peripheral vision to be ready to respond quickly. Use other foresight tools to imagine the future so that potential opportunities can be identified and potential threats prepared for.
2. Respond. A strategy which is a mix of improving operational efficiency and investing in growth through increasing market share or creating new opportunity is needed to survive and prosper during a period of uncertainty.
3. Monitor and adapt. Develop a "fast data" capability to increase agility as uncertainty develops, peaks, and ebbs.

Skills and traits needed to develop foresight

A range of skills and traits are needed in a foresight team. **Domain knowledge** is essential – if we are seeking to develop scenarios for transport, for example, then someone on the foresight team must have deep knowledge of transport. That knowledge alone, however, is not sufficient.

Imagination is essential. The Queen of England wondered out loud when meeting representatives of the UK economic profession, why no-one had seen the global financial crisis coming. Part of the (eight months) later written response by the British Academy concluded:

"So in summary, Your Majesty, the failure to **foresee** the timing, extent, and severity of the crisis and to head it off, while it had many causes, was principally a failure of **imagination** of many bright people, both in this country and internationally, to understand the risks to the system as a whole".

Broad general knowledge is also essential. Some specialists may know a lot about trees, others may know about birds, and others may know about ground dwelling animals. But it takes a generalist to integrate this into knowledge about the forest as a whole. The more uncertain the future, the greater the need for broad general knowledge.

Knowledge should include, but not be limited to: demographic trends, drivers of economic change, social trends, technology trends, climate change, political trends, and consumer opinion trends.

Open mindedness is needed to recognise fallacious known knowns and unknown knowns that have been mentally blocked.

Appendix 1: disruptive shocks over the past 50 years

This list is intended to illustrate the range of shocks rather than being comprehensive

Year	Shock(s)
1971-72	Recession
1972 to 1979	Baby bust: the number of annual births drops by 19% following the increased availability of the contraceptive pill.
1974	First oil shock: price of crude increases by 180%
1975	Recession
1977	Recession
1980	Second oil shock: price of crude increases by 150%
1981-82	Recession
1982-83	Recession (extended)
1987	Share market crash: ASX200 drops by 42% overnight
1991	Recession
1997 to 2009	Millennial drought in south eastern Australia
2000	Recession narrowly avoided as GST introduced and interest rates rise Tech wreck on the share market
2001	Terrorist attacks in New York using hijacked aircraft on September 11
2008-09	Global financial crisis, Australia narrowly avoids recession Share market crash: ASX 200 drops by 50% between October 2007 and February 2009
2010	Volcanic eruption in Iceland causes significant disruption to air travel in April
2011	Cyclone Yasi disrupts Queensland, in January and February Great earthquake and Tsunami in Japan wreaks havoc in March Severe flooding in Bangkok in November All of these events disrupted supply chains in Australia as well as causing severe local damage
2017 to 2019	Severe drought in south eastern Australia, the most severe three year drought in recorded history, leading to extensive, tragic bushfires

Appendix 2: potential disruptive shocks

Every year, the World Economic Forum brings out a risks report. Prominent on the 2020 list were a cyber attack, extreme weather, natural disasters, and human-made environmental disasters – but not a pandemic.

In 2020 Australian population growth has slumped due to a fall in net migration. Could there be a significant decline in fertility to continue slow population growth? It has been speculated that fertility will fall because young adults will be reluctant to bring children into a world where COVID-19 is still a threat in the short-term and climate change is a threat in the medium-term. The recession also has the potential to cause a temporary decline in fertility due to concerns about unemployment. Australia's fertility has been running at around 1.8 births per woman and other countries such as Italy and Japan have lower fertility of around 1.3. This topic has been researched by foreseechange and current indications are that a significant decline in fertility for an extended period is unlikely but cannot be ruled out. This research is ongoing.

Solar flares are a hazard for electronic communications. The last major disruption was the Carrington event in 1859, in the days of the telegraph. A huge solar flare followed by a large coronal mass ejection struck Earth and induced huge currents into wires causing extensive and costly damage. Lesser events struck in 1921 and in 1989, the latter causing a huge blackout in Canada. In 2012, there was an event of similar magnitude to the 1859 Carrington event which passed through Earth's orbit – fortunately, the planet was in a different quadrant of its orbit. A repeat of the Carrington event today would severely disrupt all forms of communication, power transmission, GPS and other navigation, and damage pipelines. The recovery time has been estimated at four to 10 years and the cost at up to $2 trillion in the first year.

In 1908, a large comet or asteroid caused a major explosion over Siberia (the Tunguska event). The energy released was up to 1,000 times greater than the atomic bomb dropped on Hiroshima in 1945. Fortunately the area was sparsely populated, but such an impact on a major city would be catastrophic on an unprecedented scale.

A major volcanic eruption is capable of blocking sunlight over large areas for extended periods, creating severely cold conditions. This can reduce food production and cause illness, as well as curtailing air travel. There have been several such events in history and they may happen about once every 1,000 to 2,000 years.

Appendix 3: A false known known

In 2005 Barry Marshall won a Nobel Prize for his 1982 finding that stomach ulcers are caused by an infection and not stress. In his acceptance speech, he quoted the historian Daniel Boorstin: "the greatest obstacle to knowledge is not ignorance; it is the illusion of knowledge."

In 1981 Marshall started working with pathologist Robin Warren who had earlier noticed that the gut could be over-run by a bacterium which had to be hardy to survive in the acidic stomach. Patients who had been referred for a biopsy because their doctor thought they may have cancer had such infections but not cancer. Warren wondered if this was a coincidence and Marshall agreed to investigate further. One patient on the list was a man aged 80 with severe stomach pain. The physicians considered he was too old for surgery so gave him an antibiotic for bacterial infection and sent him home. Two weeks later all pain had gone and he was in high spirits.

Marshall and Warren identified the bacteria as Helicobacter pylori. They wondered if this bacteria caused some of the stomach problems patients complained about. A conference of the Gastroenterological Society of Australia rejected their paper proposing this association.

They did manage to obtain funding for a study to investigate whether patients with duodenal ulcers had this bacteria present. They obtained a negative result in their first 30 cases.

Most people would give up at this stage. Then by a sequence of serendipitous incidents, they found that the swabs had been tested too early. When they were tested after five days, they obtained positive results!

They then claimed that that stomach ulcers (and cancers) are caused by Helicobacter pylori. This meant that ulcers should be treated with antibiotics.

The medical community lampooned Marshall – medical researchers were ***sure*** that stress caused ulcers.

Marshall then used himself as the guinea pig. He extracted some Helicobacter pylori from a patient with gastritis and swallowed it. Within a few days he developed gastritis, moving towards an ulcer. After a biopsy on his gut, he had shown that the bacteria caused ulcers. He collected additional data and had a conclusive case by 1983. But the medical community still rejected his findings for another ten years.

Only after he moved to the United States and gained coverage in popular magazines did health authorities take his findings seriously. The medical community has finally accepted his findings – and that their previous long-held assumptions were ***false known knowns***.

This account is one of many wonderful case studies in "Seeing what others don't" by Gary Klein. It illustrates the remarkable routes to insight.

Appendix 4: slow and steady disruptions

There are changes which are slow, but steady and seemingly irrevocable – but often we do too little to manage the consequences and risks. This procrastination has current and future financial and human costs.

One of these is the ageing population, combined with still increasing lifespans. The baby boom of 1946 to 1964 was followed by a baby bust in the 1970's as women became more able to control their fertility. This meant that there would be a large generation reaching the traditional retirement age around 2011, followed by a smaller generation than would have previously been expected. This future problem was evident before 1980. The predictable consequences were increased funding to pay age pensions, increased demand for health and aged care facilities, and a need to encourage people aged over 65 to keep working.

In the 1990's a compulsory superannuation scheme was set up and every other predictable need was also put off. We have not caught up with the needed infrastructure and services yet and there are too many people over 65 who want to keep working but who cannot secure a job.

Another is climate change. The countries of the world gathered in Rio di Janeiro in 1992 and agreed to take action to reduce the risk of dangerous climate change. In the 29 years since, the concentration of carbon dioxide in the atmosphere has continued increasing at the same rate. Temperatures in Australia and much of the world continue to increase. Sea levels are increasing at a faster rate.

Appendix 5: predicting extreme bushfire conditions in 2019-20

Twelve years ago, economist Ross Garnaut made a prophecy that has devastatingly come true.

In the 2008 Garnaut Climate Change Review, which examined the scientific evidence around the impacts of climate change on Australia and its economy, he predicted that without adequate action, the nation would face a more frequent and intense fire season by 2020.

ABC News, 8 January 2020

I, too, provided warnings. In July 2011, I wrote to the Victorian water minister predicting severe drought in the period 2017 to 2022. The prediction was applicable to much of south eastern Australia. The reply, In September 2011, said that the driver of drought which I proposed was not considered by mainstream climate scientists to have a plausible mechanism. The reply said that planning processes are designed to cope with variability including severe drought.

In January 2019, I again wrote to the Victorian water minister saying that my prediction had come true and that it was time my predictions were taken seriously. I included a copy of the previous correspondence. It was a different water minister and a government of a different political party, but the reply was almost a carbon copy: the government works with Australia's most experienced and respected researchers and planning processes are designed to cope with a wide range of climate futures including prolonged drought. Only months later the many victims of the terrible bushfires would disagree with that statement!

Twenty-three former fire and emergency leaders say they tried for months to warn Prime Minister Scott Morrison, beginning in April 2019, that Australia needed more water-bombers to tackle bigger, faster and hotter bushfires. They were not able to get a hearing.

The catastrophic bushfire conditions were caused by both extremely low rainfall and record high temperatures. This combination of conditions was unprecedented, but predicted. The charts on the following page show how severe the conditions were in the three years 2017 to 2019.

Chart 1 shows the annual rainfall in the Murray Darling Basin, along with the rolling three year average. The average over the period 2017 to 2019 was the lowest ever recorded three year period, consistent with my 2011 prediction. Chart 2 shows the mean temperature and the three year average. The three year average temperature over the period 2017 to 2019 was the highest on record by a huge margin. Even more severe conditions may be less than 20 years away!

Chart 1

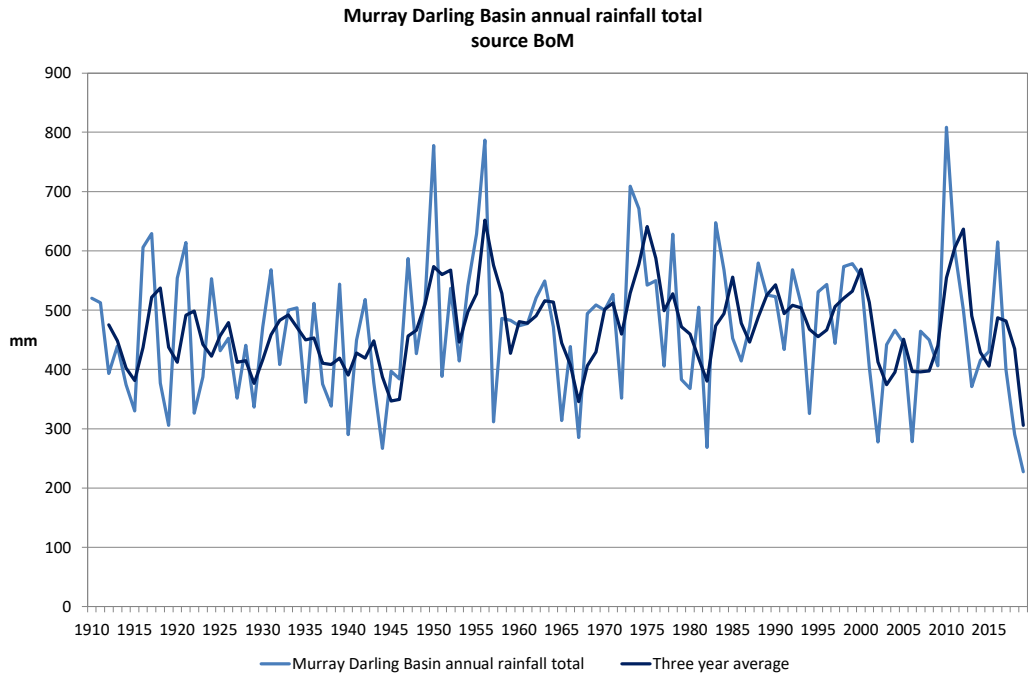
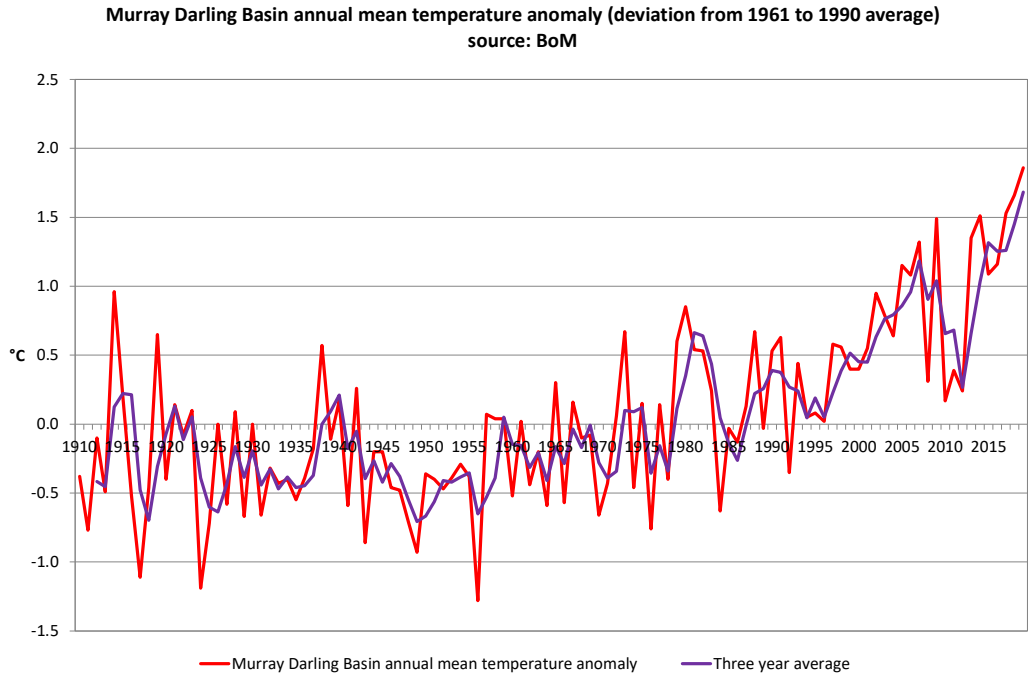


Chart 2



Appendix 6: World Economic Forum Risks Reports

The reports are typically prepared in October and released the following January.

The Risk Report for 2020, released in January 2020 identified the top risks as set out in the table below. Note that infectious disease did not appear in the top ten highest likelihood risks and appears as the tenth highest impact risk.

Highest likelihood	Highest impact
Extreme weather	Climate action failure
Climate action failure	Weapons of mass destruction
Natural disasters	Biodiversity loss
Biodiversity loss	Extreme weather
Human-made environmental disasters	Water crises
Data fraud or theft	Information infrastructure breakdown
Cyber attacks	Natural disasters
Water crises	Cyber attacks
Global governance failure	Human-made environmental disasters
Asset bubbles	Infectious disease

The 2021 report has cast infectious disease as the fourth highest likelihood risk and the top highest impact risk.

The top three highest likelihood risks are extreme weather, climate action failure, and human environmental damage.

An innovation in the 2021 report is a time horizon, with the top three clear and present dangers over the next two years being: infectious disease; livelihood crises, and extreme weather events.

The reports contain well-researched articles. In the current report, for example, is an article titled "Pandennials: youth in an age of lost opportunity". It starts with the premise that today's youth already bear the scars of a decade-long financial crisis, an outdated education system, and an entrenched climate crisis, as well as violence in many places.