Australia's Black Swans – that will threaten our future

Black Swans

"First, it is an outlier, as it lies outside the realm of regular expectations, because nothing in the past can convincingly point to its possibility. Second, it carries an extreme 'impact'. Third, in spite of its outlier status, human nature makes us concoct explanations for its occurrence after the fact, making it explainable and predictable."

-Nassim Nicholas Taleb, 2001,

Australia faces several possible Black Swan events approaching. Their impact would be extreme, and until recently would have been assumed near impossible, based on widely held assumptions, and well-known events in living memory.

1. An electricity crisis, on a continent richly endowed with multiple abundant feedstocks
2. A gas crisis, in the domestic market of one of the world's largest gas exporters
3. A liquid fuels crisis, in a country which depends on liquid fuels for almost all transport
4. An industrial collapse, in a long-since industrialised country
5. A military capability gap, with the 12th largest defence budget in the world
6. A military crisis leading to war, in Asia

The last one, being perhaps the most canonical sort of Black Swan which the 20th Century history taught many people to look out for, is perhaps the one which is widely considered as steadily increasing in probability.

The remainder, however, are/were not widely anticipated, except by a few well-placed experts, who are starting to sound alarm bells, but struggling to raise the attention of the political establishment.

The reality is that 1-5 will be very easily and quickly explained in retrospect. This is because things which we assume are constant and reliable - like readily available energy at a good price, and a military able to deter aggression – aren't things that exist by default, to be disrupted by a 'Black Swan'. They are only there because a great many well-coordinated pieces were put in place to ensure that they would be there. The fact that they have been successfully and consistently put in place in the past for some time, by someone, is by no means a guarantee that they will be in the future. But it will take a crisis for this to become clear.

Arguably these crises will occur because of the steady de-skilling of the professional technical/commercial capability of the public sector, at both the States and Federal levels, over the last couple of decades. These were the institutions on which we have so long relied in order to put the well-coordinated pieces in place. However, in a slow trend which originated around Thatcher and which continues today, the idea that society could collectively provide for its material well-being through public provision and planning has become less and less fashionable. Increasingly faith is placed only in individuals, the companies they voluntarily form, and the markets within which they interact.

Markets have been and will be the optimal providers for most of our society's economic needs for some time. But in a few key areas, such as core national infrastructure, defence and the industry

that supports it, this faith is misplaced. In these areas, market forces are no substitute for government policy, which should derive from a carefully planned national strategy. Privatisation and out-sourcing has left governments at all levels with a paucity of experienced professional and 'fearless' advice, which is essential to create the strategies and policies within which market forces can effectively provide the outcomes we need, and have come to expect. Given the slow-changing nature of these industries and assets, cracks are only just recently beginning to emerge in public view.

Electricity is a critical current example, where our electricity prices have gone from being amongst the lowest in the world to now be (according to Bluescope) ten times what they are in USA - and supply is unreliable. Black-outs have already occurred in South Australia, and are anticipated to occur in other states after the closing of Hazelwood power station in Victoria. State Governments have steadily subsidised intermittent power generators, and federal governments have intermittently taxed base-load generators. The result is predictable. Private investment is withdrawn from large, emissions-intensive generators (e.g. Hazelwood), and generation mix shifts increasingly towards intermittent sources. The result is that households and industry pay more, and the grid becomes less stable, since it is now required to do a job for which it was not designed.

The immediate electricity security issue can be solved by going out to tender for a number of 'storage/back-up' facilities located across SA/Vic and eastern Australia (realising that 'storage/back-up' can be; better-use of existing hydro, new pumped-hydro, Li-Ion batteries, molten salt or silicon, flywheels, hot-water or ice, diesels, reciprocating gas-engines, et al) - together with appropriate tweaks of the National Electricity Market (NEM) regulations. All this requires is a coordinated policy decision. However it seems that could be something the State and Federal Governments, individual and collectively, may be incapable of. If so, the result will be widespread black-outs, and soaring energy costs. It seems unthinkable today, when it happens it will appear to have been inevitable all along.

In lock-step, gas prices have now gone from $2-3/GJ to over $20/GJ (forward contracts) over the last decade and there could soon be gas shortages for major industry. This is also the simple and inevitable consequence of a failure to make coordinated, long-term policy Markets will dictate that finance for the enormous multi-billion dollar capital investments in gas projects that has occurred over the last 10-15 years (Gorgon, Gladstone, Pluto, Curtis) is most easily obtained with a long-term fixed price contract to underwrite it, for as large a volume of gas a possible. At the time nothing was done to inhibit or restrict the writing of such contracts, or mandate minimum provisions to (or cap on drawing from) the local market, since local shortages were thought impossible. Yet since that time, development of additional potential gas projects in Victoria has been prohibited, at the same time that the global market is resurgent, and our electricity grid increasingly reliant on gas-fired stations to fill the gaps left by renewable sources. The only remaining option to avoid crisis is to intervene (using executive power to overturn the earlier contracts), but this will spoil our reputation as being a safe investment destination in the future. Prudent central planning could have easily avoided this vexing situation.

The prospect of facing intermittent electricity supplies, and high-priced gas, is almost certainly going to lead to the increasingly rapid de-industrialisation of the East Coast of Australia. Australia already faces a relatively high labour price, and a long distances to markets, factors which have already lead

to the closure of significant manufacturing industries such as car-making. We are now in the process of destroying what could have been Australia's great competitive advantage for manufacture: cheap and reliable energy inputs.

In the absence of natural competitive advantages for manufacture, the Australian government has acted to ensure that at least one heavy manufacturing industry (military-ship building) is retained within Australia. A program of 'continuous ship-building' has been announced, beginning with the Offshore Patrol Vessels (SEA 1180) and Future Frigates (SEA 5000) programs, as well as the Future Submarine Project, about which a Government Minister has stated that 90% of the Future Submarines (FSM) will be done in Australia.

The 'Black Swan' event which looms large is that these efforts still leave Australia without an industry capable of building or maintaining warfighting vessels, and the key technologies they depend upon.

That this is the case for the Future Submarines is only thinly disguised. Despite being offered a guarantee of all 12 submarines being built in Australia by the German tkMS group, in a cutting-edge digital shipyard at almost no extra cost, the Australian government chose French Government owned DCNS, who had made no such guarantee in their proposal. Immediately on announcement of the contract being awarded to DCNS, announcements were made in by the President of France which showed that it was really intended that the vast majority of the work would be done in France. Recently the Australian CEO of DCNS Australia resigned, presumably anticipating the imminent pain of reconciling the irreconcilable promises of Australian politicians, and the actual construction plan of the French shipbuilder.

In reality, the surface ships are in a similar position. The rush to kick-off the Offshore Patrol Vessels (SEA 1180) and Future Frigates (SEA 5000) programs – to achieve early cut-steel dates in 2018 and 2020 respectively, is driven by political optics, rather than industrial demands. Ironically the early cut-steel dates are not likely to have any real effect in saving current shipbuilding jobs in Adelaide, that will have already run-down in the relevant steel fabrication trades on Air Warfare Destroyers (AWDs) prior to these dates - and the fast-track process could result in similarly significant cost and schedule blow-outs in the new projects.

Instead, a slightly longer competitive design development and fixed price request for tender (RFT) process would enable transparent and binding commitments to Australian manufacturing content – as was done for the Collins Submarines, ANZAC Frigates, Minehunters and Hydrographic Ships programs in the 1980s and 1990s.

But due to the arguably unnecessary rush, the shipbuilders will almost certainly revert to procuring most of the designs, components, equipment and systems for the ships from overseas. In Australia industry will most likely just end up assembling the ships for both the SEA 1180 and SEA 5000 programs – like overseas supplied 'Meccano-sets', or 'IKEA flat-packs'. This will be a reversion to what was done for the US designed frigates (FFG 05 and 06) in the late 1980s. The same approach was also used with the Spanish designed AWDs during the last decade, where inadequate/non-existent effort to re-engineer the overseas design details, drawings and data, led to a disastrous

series of mishaps and blunders when the construction was attempted with Australian industry, leading to massive cost and schedule blowouts.

Through-life support costs also inevitably soar in this scenario, and it is improbable that, even beyond the first four ships of both the Offshore Patrol Vessels and the Future Frigates, the detailed designs will be able to be substantially changed to economically include more Australian industry content into the ships. Configuration/change management and inventory control becomes a nightmare.

This will be a very expensive and ineffective approach - that will exclude Australian manufacturing industry from the short-term and long-term through life supply of components. It will leave our Navy largely dependent on overseas supply chains - as was the case for their Oberon submarines and FFG frigates, inter alia. Consequently the path embarked upon nominally to ensure robust, sovereign defence-industry base will actually ensure we are in precisely the vulnerable situation we have sought to avoid. We'll have large parts of essential supply chain inextricably tied to overseas suppliers. This means our supply chains can be cut-off, as was done for the RAN's Oberon Class Submarines during the Falklands War, when our great ally, the UK, ceased supplying support in their own time of military crisis.

Even discounting that we may not have the ability to take a spanner to our own platforms in a time of crisis, two more black swans may see us not even having platforms available for use on the 'first day of the war'.

The first is a well-documented dependence on liquid fuels. Despite having access to some considerable supplies of crude oil, and previously having a strong refining industry, Australia is progressively closing its refineries, and reducing its production of oil. New technologies which could convert even more abundant feedstocks (lignite, shale oil, or gas) into crude have been neglected. Consequently we are now in a situation where almost all of our liquid fuels are imported, an increasing fraction of them already refined, and almost all of them coming directly from or via Singapore. Any crisis which restricted ship-movements around Singapore (the Malacca Straits, South China Sea) would result in Australia being cut-off from the liquid fuels on which its military forces, and domestic transport network (including for food) are reliant. Our local reserves are sometimes only sufficient for a couple of weeks, and for certain military fuels even less when operating at a high tempo. One black swan would see a capable, well-maintained military force stuck at base during an emergency due to fuel shortages – with industry stalled and the community in panicked chaos.

The second swan is a question of platform choice and delivery timing for the crucial maritime strike capability on which Australia's national security ultimately rests. In the last ten years, the Future Submarine Program has slipped in schedule by ten years, with the first submarines not *expected* to be delivered according to the DCNS timetable until the mid-2030s, years after the scheduled beginning of the retirement of the Collins Class Submarine. Of course, for a 'from scratch' new design for a submarine of this size, the probability of further delays is high. Many of Australia's most widely respected commentators are now incredulous at the mismatch between the statement of strategic need and our acquisition timetable. Whereas Australia's Defence White Paper points out that China will operate around 70 submarines by 2020, and have 'major impact on the stability of

the Indo-Pacific to 2035', Australia's new submarines will only *begin* arriving after that time, and not reach the full strength of 12 until well into the 2050s.

The enormous delays, and excessive cost-blow out in the submarines can also be directly attributed to a failure by government officials to set a clear, logical policy and program objectives. The uniquely large and expensive design derives from the fact that naval commanders probably actually wanted a nuclear submarine, but were politically unable to specify one. The result is an unwieldy mismatch of technologies which will hamper capability and drive up cost and risk. The submarine being procured will be missing key technologies that every other sophisticated operator of diesel-electric submarines is demanding, such as Air Independent Propulsion, and Lithium-Ion batteries. And it will include technologies from nuclear submarines that no other operator of diesel-electrics in their right mind would include, such as a pump-jet propulsion system, which is only more efficient and quieter at speeds which our diesel submarines could sustain for a matter of minutes. Again, such inept planning ultimately stems from government organisations devoid of people who have the skills, expertise, as well as mandate to think and speak clearly and critically enough about the strategic, tactical, and technical specification to avoid such blunders. Again, our complete lack of a credible submarine deterrent force will appear unthinkable until it is exposed in a crisis, but in hindsight it will appear inevitable.

Similarly, the other major maritime strike and air defence platform, our Joint Strike-Fighter (JSF) jet aircraft, are also on track for a strategically problematic gap emerging in timing of platform transition and alignment of capability against actual strategic needs. Australia will rely on the F-35 not only to replace the air-combat capability of the ageing Hornets, but also their maritime strike capability. The F-35 is also a platform criticised for confusion in the definition of its design requirements leading to demonstrably inadequate capability on all key air-superiority metrics, kinematic, information gathering, and sensor capability, as well as enormous cost and schedule blow-outs. The inability to maintain air superiority in the air-sea-land gap is of critical strategic importance, as it permits other nations to deny the use of the air-sea-land gap to Australia's naval surface fleet, and air force assets that are unable to defend themselves against advanced fighter aircraft, examples being our critical long range maritime patrol aircraft, or Wedgetail airborne early warning and control aircraft, Super Hornets, and Growlers.

One of the most important compromises that affects Australia is that the JSF was designed without the capacity to carry any standoff maritime strike missile, or even a laser guidance system to guide a bomb onto a moving target. At present, the *only* maritime strike missile to fit the F-35 weapons bay is still in development, in Norway, where we will source all our supplies of this crucial munition. Like many other capabilities of the F-35 which seem core to most of its many roles (like being able to carry more than two radar guided missiles in internal weapons-bays, or launch an infra-red guided close combat missile from an internal bay), full integration with a maritime strike weapon is likely to be shifted to later blocks of production, and might well fall far beyond the slated 2023 'Full Operational Capability'.

As the early 2020s approach, we've scheduled the retirement of about 70 airframes that can carry Harpoon standoff anti-ship missiles and laser-guided bombs, which make up a proven, reliable, and substantial maritime strike capability. The airframes slated to replace them aren't compatible with

any existing maritime strike missile, whether the legacy Harpoon or new LRASM, based on the JASSM to be carried by Australia's legacy Hornets. It's quite conceivable that we will rely on this small group of 4th generation Super-Hornets for some time to provide this key maritime strike capability in the 2020s or early 2030s, just as China overtakes the US as the undisputed economic leader in Asia, and their military capability catches up and substantially displaces US influence in the Western Pacific. The susceptibility of the Super Hornet to the latest Russian and Chinese built stealth fighters is beyond dispute, so in the absence of air superiority, Australia's ability to bring to bear what maritime air strike capability remains is thus severely compromised.

In summary, without dramatic intervention, in the next 10-20 years, it is actually highly probable that some seemingly unlikely things could occur.

Put differently, Australia is now accepting a level of strategic risk that would have been unthinkable, and considered unacceptable, even one decade ago.

A country that could be one of the wealthiest in the world could have its economy substantially damaged by the failure to maintain reliable energy supply, despite having a vast continent richly endowed with almost every imaginable feedstock, renewable, nuclear or fossil. By failing to uptake our only natural advantage for industry and manufacture, we could become a peculiar economic outlier: one of the least industrialised countries in the 'developed' world. For a sparsely populated, richly minerally endowed continent lying at the foot of Asia in the decades when the global order becomes multipolar, and shifts it's centre of gravity to Asia, this is a highly undesirable circumstance.

In the ultimate of ironies, the rush to protect naval ship-building as a strategic industry will do the opposite. We will lock our country into rushed cut-metal dates which necessitate buying what will essentially be off-the shelf, 'flat-pack' ships, locking Australian industry out of any of the meaningful development of the design or supply-chain for major sub-systems. Our defence industry will become the defence equivalent of an Ikea-assembly-guy with an 'allen-key'.

The cumbersome, outdated, completely bespoke submarine program won't be delivered in any meaningful capability improvement until decades after the global order has shifted, and most risk of imbalance or adventurism is settled - one way or another - in the 2020s and 2030s. And our particular choice of partner will likely never transfer meaningful technical capability outside of France, since their state-owned, highly unionised shipyards are the singular growth industry in their own sputtering economy. Moreover, DCNS has a consistent track-record of disappointing their overseas customers.

Should a crisis occur during this period we could find ourselves with precious few maritime strike platforms, and no ability to independently replace them, take a spanner to them, or replenish the weapons and combat systems they rely upon, let alone keep them alive in the air. While China will be counting its strike aircraft in the hundreds and thousands, increasingly 5th generation, we'll rely on a single squadron of fourth generation planes we can almost count on our fingers and toes. And our (six) submarines will be seeing out the end of an un-planned life extension, probably over 40 years old. The one or two we could put to sea at any time will offer only a shadow of the deterrent threat, given the vast thatch of sea-lanes that could be used to approach us, through or around the

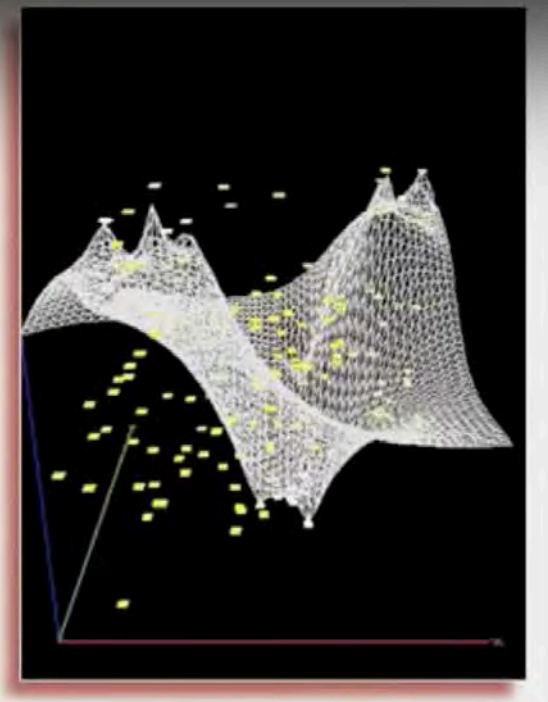
Indonesian Archipelago. At the same time, we will have routed almost all of our liquid fuel supplies via a singular point, at the intersection of the straits and seas which are quite likely to be most hotly contested, and easily closed, by enemies or friends, in a time of conflict. Domestic reserves will last only weeks before the vast trucking network that brings our food from the farms to our cities grinds to a halt. Our military forces may have even less time, depending on tempo operations.

Unless a dramatic intervention occurs, Australia's leadership will let us drift into a horizon already crowded with deadly black swans.

Dr John White

30th April 2017

Research & monitoring



Prediction

Pareto world

Hypothesis/ inductive

Nil-hypothesis/ abductive

Gaussian world

Log of event frequency

Log of event size

6. Energy Security: *Electricity Crisis*

5. Energy Security: *Dependency on O'seas Oil &Gas*

4. Economic Security: *Aust Industry Crisis*

3. Shipbuilding Policy: *Unintended Consequences*

Probable

Possible

Plausible

1. Air Power/JSF
2. Sea Power/FSP

Defence Security

Defence Security

UNSAFE AUSTRALIA

0. TRAJECTORY TO WAR

Trigger Anticipatory awareness

BLACK SWAN EVENTS: RISKS & OPPORTUNITIES