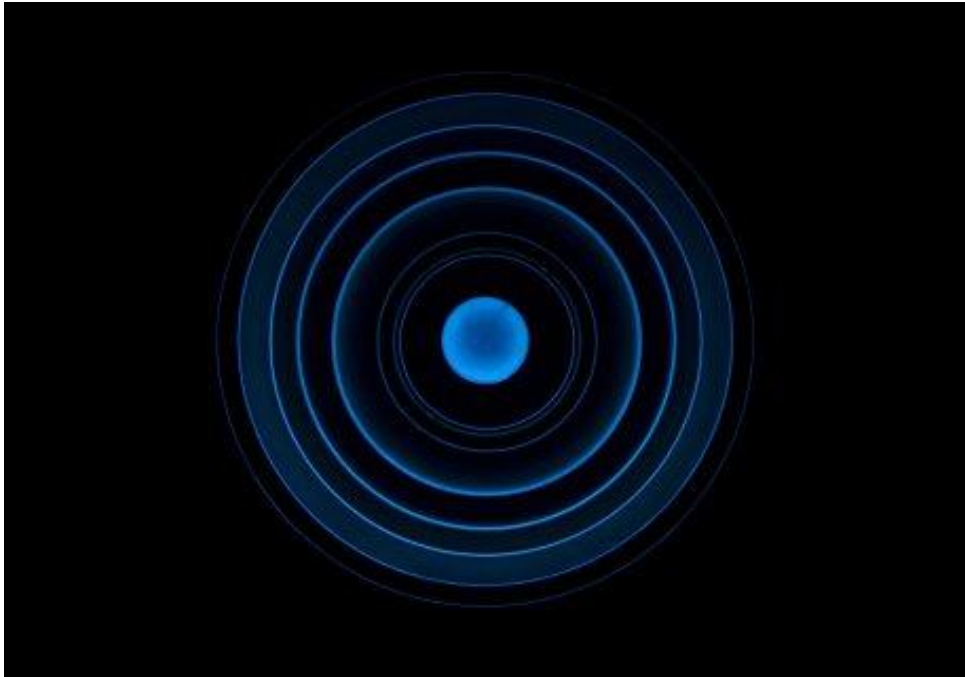




Reviews and miscellaneous

Throughout 2019 we attended conferences, exhibitions, seminars and read books many of which we reviewed for our blog. Also other subjects caught our interest and these are included in this collection.

Looking one year ahead



The turn of the year means that one's inbox inevitably gets overwhelmed with "The world in the new year" pieces. Some are so general to be almost cut-and-paste from each other; some sector-specific ones are full of grinding detail; some (and I think this is relatively new) are so politically tilted that they are almost unreadable. And, if one is engaged in futures and strategy, they all have to be read, and thought through, and analysed.

The short time horizon of "the next twelve months" is not one in which SAMI generally operates. We prefer to drive strategy from the point of view of the future, not forgetting the important lessons from history. Too many assumptions are built into the present, and it is part of the freshness of the future-driven approach that those assumptions can be challenged in a way which is positively useful, as opposed to simply building out from the world as it is.

So one particular piece, circulated at the beginning of December 2018 by Saxo Capital Markets <https://www.home.saxo/en-gb/insights/news-and-research/thought-leadership/outrageous-predictions> really caught our eye. Even



the headline is promising “Outrageous Predictions 2019”, which at least implies a awareness often missing in many short term projections. As the authors say, “Riding roughshod over the consensus, they look at some highly unlikely events that could have a tremendous market impact – if they come to fruition”. The caution here is important – those of us who look at the future from a professional standpoint tend to disdain the wilder reaches of futurology, because evidence and clear-thinking is important; but heavily caveated thinking such as this can be useful in developing weak signals, fostering creative thought, and crashing other people’s thoughts up against one’s own in a way which may generate useful results.

Whilst the predictions are focussed on the capital markets, there is a lot of food for thought. Let’s look at a few of them, and draw out the long term futures lessons.

EU announces a debt jubilee

As a response to the unsustainable levels of public debt (Italy will have to refinance EUR300 billion in 2019, for instance), and in response to the *gilets jaunes* protests and the populist tide, this would be a politically attractive move for the ECB. It is probably politically unacceptable in Germany, but were it a way of stopping the Eurozone fragmenting or the Euro collapsing, then it enters the realms of the feasible. Long term, this points up one of the central embedded risks within the EU which will, at some stage, have to be resolved – debt, both public and private, is at an unsustainable level. The world is not yet out of the effects of the great recession of 2007-9, and the two factors – debt and the tail of the recession – taken together will require some real action in the next 5-10 years.

Global transportation tax enacted as climate panic spreads

SAMI’s global drivers have included climate change since their inception. Towards the end of last year, we moved climate change from its role as one amongst many to a higher level of importance, where it is included force majeure in every scenario, since we believe that the evidence now shows it as an ongoing and increasing event. A global taxation response seems to be beyond the ability of the world to organise at present; but Saxo’s prediction is a valid one: climate change will require policy responses which both dissuade fossil fuel use *and* which raise funds for climate change mitigation. We are already seeing global responses, but we see a response such as this as being unlikely in the near term – the lesson of climate change is that governments respond late, inadequately, and only under pressure. However, we do see local taxation being an option in the short-medium term.



X-class solar flare creates chaos and inflicts \$2tn of damage

There is a new Solar Cycle coming round in 2019. In 2012, the earth just missed an X-class flare. We may not be so lucky in 2019. We certainly will get one at some stage in the future. This is one of those science-fiction sounding outside risks which, on closer examination, are actually very real; but like the risk of the eruption of the Yellowstone supervolcano, one which it is possible to anticipate, though perhaps not to plan for.

Prime Minister Corbyn sends GBPUSD to parity

Our work on “**Britain in 2030: Four post-Brexit scenarios**” encompasses four future scenarios for the UK and the world. This prediction is one which plays well into our scenario set, though we anticipate that any fall-out from it would have resolved into one of our scenarios in ten years’ time. However, those in the City who we have spoken to occasionally raise the “triple whammy” of a hard Brexit, followed by an election in which Labour wins, followed by the imposition of exchange controls, and we could certainly see that that would cause Sterling and the Dollar to reach parity (alongside the Euro, probably). This would make UK exports significantly cheaper, but push up the cost of imports and hence the cost of living in the UK. UK businesses would become even more attractive for takeover by overseas companies. And, no matter what happens with the ability of Brits to travel following Brexit, we would have to rediscover the joys of Britain’s wonderful holiday destinations, as going abroad would become impractically expensive. Labour may not get the chance to run for office until 2022, thanks to the Fixed Term Parliaments Act, so we can put this one into the “medium term” – though the very real risks of Brexit may well cause serious movement on exchange rates even absent a Labour victory.

Saxo’s outrageous predictions are indeed outrageous. But they’re good for provoking thought for the medium term, if not all for 2019. Have a look – there are ten in total – and let us know your views!

Written by Jonathan Blanchard Smith, SAMI Fellow and Director, published 11 January 2019



China's Obstacle Race



The Dragon Awakes

China's emergence as a global economic power has been spectacular and enthralling. Back in 1977, when Chairman Mao Zedong died, China's GDP per capita was \$185. 40 years later it is \$8,836. **From 1979 to 2010, China enjoyed annual average GDP growth of 9.9%.** China's economy overtook Italy in 2000, France in 2005, the UK in 2006, Germany in 2007 and Japan in 2010. In 2017 GDP by expenditure stood at \$12.84 trillion, second only to the USA. Using Purchasing Power Parity (PPP) it overtook the USA in 2014.

As a manufacturer and net exporter, China enjoyed a trade surplus of \$323 billion in 2018. And China is – true to the classic development model followed by Asian tigers Japan and South Korea – moving through the gears from basic manufacturing, through assembling parts, to cutting edge technology and innovation. On 3 January, *Chang'e 4* became the first spacecraft to land on the far side of the moon. On 15 January it was announced that the craft had germinated a cotton seed on the moon's surface. There may be more surprises to come. It would be quite likely that the next person to walk on the moon's surface will be Chinese: the first non-American to do so.

And China is investing in its future. In 2017 40% of global investment in artificial intelligence was made in China – even more than the USA (34%) – those two tech powers leaving the rest of the world with a residual 26%. China has invested massively in its own infrastructure, and its Belt and Road initiative is designed to link China, through Asia and the Middle East to Europe and Africa. China is funding



deep-sea ports in Asia and Africa, pipelines in Central Asia, and upgrading rail and road links in Africa. It is now possible to travel by train from Beijing to Barking.

The Chinese Century?

Just as the 19th century was dominated by Britain – the first industrial nation – and the 20th by the USA, will the 21st century be dominated by China? A continuation of the trends outlined above would suggest it might.

- A **population of 1.1 billion, which will increase to 1.44 billion by 2030**, and within that, an expanding middle class with growing spending power
- Rapid advances in technology – not only in space and AI, but in telecoms, car manufacturing, biotech
- A desire for environmental improvement (driven by that expanding middle class), which is driving expansion of renewable energy
- A **growing economy, which has already over taken the US in PPP terms, and may do so in absolute terms by the middle of this century**
- A stable political environment, with little sign of significant opposition to the current system, that trades economic freedom (and economic growth) for the political hegemony of the Communist Party

What Could Possibly Go Wrong?

Here at SAMI, we know that forecasting the future is a pretty chancy activity. Better by far to develop scenarios that set out different ways in which the future might take shape. Looking at China, we see plenty of evidence to suggest that China's path in the rest of the century may not be entirely serene. Indeed as far back as 2006, we identified, **in a report for the City of London, some potential risks ahead.**

Having peaked in 2030, China's **population** is projected to go into decline, falling to 1.36 billion by 2050, and then projected to go on falling back to 1.0 billion by the end of the century. And the population will be aging. Median age, currently 38.7, is projected to rise to 48.0 by 2050, and go on rising thereafter. As the population rises, so the ratio of workers to retirees will fall from the current, very favourable 5:1, to as low as 2:1. The total population figure hides an imbalance, with 116 males to every 100 females. This declining and aging population will contrast with neighbours such as India and Indonesia, and even more starkly with Africa, whose population is projected to have doubled between 2000 and 2050, and – according to UN projections – may do so again by 2100.

China's **ethnic minorities** make up just 8.5% of the population, but in a large geographical spread of Western China, principally Tibet and Xinjiang, minorities make up the majority of the population. To date China has been successful (and ruthless) in minimising dissent in these regions, but the potential for future conflicts should not be ignored.



The additional tensions of centrally managing a vast country should not be ignored. Harsh and all-pervasive **central control** carries an inherent potential for implosion – the disintegration of the Soviet Union being an example of which the Chinese Communist Party is all too well aware. As the economic differences between the industrial core cities and the countryside becomes increasingly stark, and as those cities themselves develop, the demand for increasing local autonomy and independence from the centre may become too strong to be ignored.

China has benefited from the globalisation of trade, with that global trade surplus of some \$325 billion. The rise of **protectionism** – especially in the USA – represents a threat to the prospect of continuing high levels of growth. The Belt and Road initiative has seen China achieving great influence in countries in Asia (Burma and Sri Lanka, for example) and sub-Saharan Africa. But there have also been signals that this influence could itself become a bone of contention, with resistance in some countries to alleged economic colonialism, and concerns in other countries about the extent of Chinese power, particularly in South East Asia.

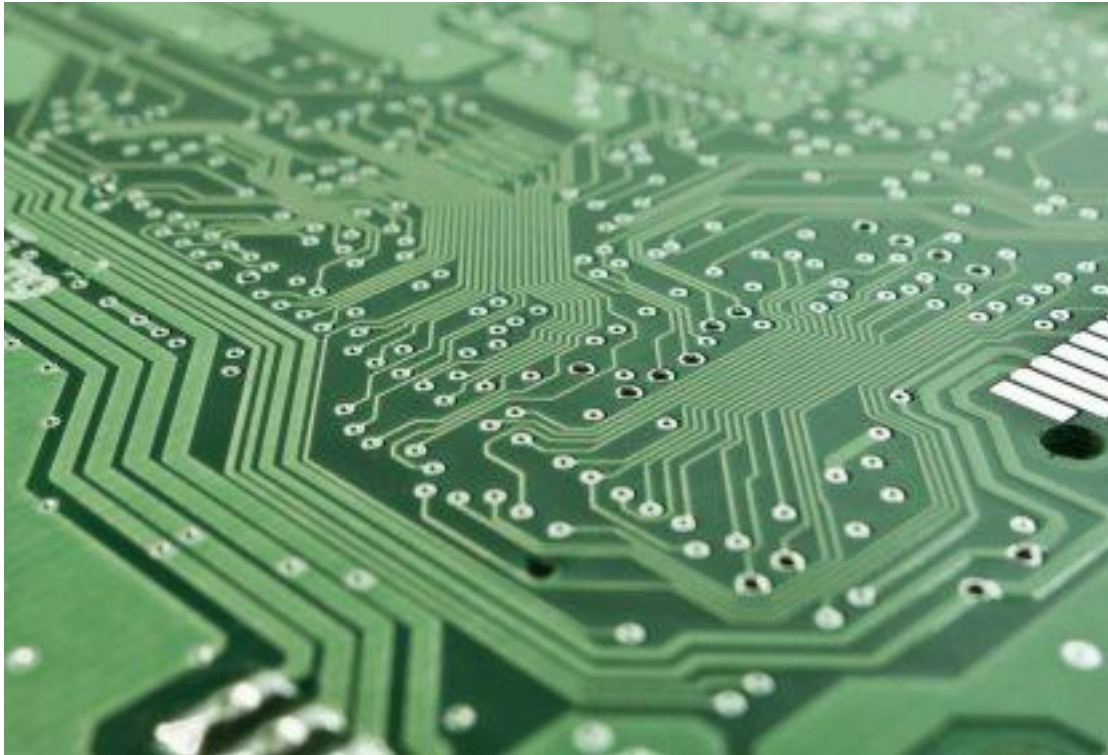
The rise to economic dominance may come with a rise in **military challenge**. The development of small atolls into heavily defended military bases in the South China Sea and beyond combined with the reluctance of other military powers to cede zones of influence and, particularly, rights to access international waters, will lead to a rise in military tension – especially with US allies. Japan especially is making significant changes to its military and constitutional attitude to war.

Taken together with the domestic impact of the aging of its population, these threats to China's economy and stability could see a steady downward pressure on economic growth. China is fully aware of these future risks, indeed they help to explain the urgency with which she is investing in infrastructure at home, in technology, and in building alliances overseas and developing in military power. It may be, though, that these trends combined are beyond even the Party's ability to control.

Written by David Lye, SAMI Fellow and Director, published 25 January 2019



“Immature” Superintelligence



I met up with Tony Czarnecki of **Sustensis** recently to follow up some of his ideas on superintelligence, and the Singularity. Tony is the author of a **book** called “Who can save Humanity from Superintelligence?”, and is concerned that such developments could happen very quickly and would need international co-operation to manage the risks.

Despite the many rapid advances of AI in different fields, I’ve always been sceptical about the speed with which Artificial General Intelligence (AGI) might come about. The UN has suggested maybe 2045/50 which would give us time to adjust – but even that I thought was too “optimistic”. Tony had in mind just 10 years before real threats emerge, so I was interested to hear why.

Tony’s intriguing new idea was the concept of a malevolent **“Immature” Superintelligence**, which on first hearing made me think of AI behaving like an adolescent – rather terrifying! AI doesn’t have to be fully AGI before it could deliberately pose serious threats to society. It could purposefully set off malicious process control events. Or it could make mistakes, erroneously executing its tasks. Such threats could include switching off critical infrastructure, releasing bacteria from controlled labs, creating false military postures (and hence over-reactions), even firing nuclear weapons.



The underlying reason for these risks developing is the inherent difficulty of training AI systems to meet specific objectives. In the confines of a highly structured environment like chess or Go, success or failure is clear. But in real-world situations even defining what “good” looks like is itself a challenge. Setting up measures and metrics is fraught with difficulty often producing unwanted consequences – think of Ofsted who have just decided that education is not all about exam results. Anyone who has ever designed a bonus system for salespeople knows that their bonus-maximising behaviours are fantastic and you had better be pretty sure you are rewarding the right things.

There are also issues about AI systems setting their own goals, or at least sub-goals against some meta-level objective. And having them identify when specific rules should be broken or ignored in the context of the greater good. When do you drive through a red light (it might not be working properly)? When do you put country before party? When do you act against your own self-interest?

This leads us into the difficult area of ethics. And, in a global context, whose ethics? Even if a UN for AI could be established, the chances of agreement on a set of “Universal Values of Humanity” must be low – the Universal Declaration of Human Rights is a major achievement, but hardly a comprehensive success. Can we expect to see religious AI? LGBTQ+ AI?

This takes on to the “wetware” argument – that human (and animal) intelligence is intrinsically related to its physical nature. Octopus intelligence is different because it senses the world differently. Basically this is challenging the Mind-Body duality of Cartesian philosophy, which seems to unwittingly underpin much AI. That AI cannot become superior to human intelligence until it learns to play, feel pain, become emotional, become unstable, love.

So much of my scepticism about AGI any time soon remains. But I do agree with Tony that there are huge risks in implementing AI successfully, and that concerted action is needed to make sure the world knows that and does something to control what someone called the G-MAFIA (Google, Microsoft, Apple, Facebook, IBM, Amazon) actually build.

Written by Huw Williams, SAMI Principal, published 6 February 2019



BP Energy Outlook 2019 and CO₂ emissions

In their **annual Energy Outlook**, BP identified the dual challenge of the need for more energy to support global economic growth and rising prosperity, and the need for transition to a lower carbon future.

They used a scenario approach to address uncertainties in demand and climate change action out to 2040. They stress that scenarios are not forecasts but ways of exploring the implications of different judgements and assumptions. CEO Bob Dudley said that this approach “will give us flexibility and agility to meet uncertainty head on” – the principal goal of scenario planning.

The first scenario, which is discussed in most detail, is a simple evolutionary one: “**Evolving Transition**”. We might think of it as a base case: it assumes that government policies, technologies and societal preferences evolve much as they have done in the recent past.

Even so, some interesting conclusions emerge:

- Global energy demand grows by a third to 2040, with energy consumed by industry and buildings accounting for 75% of the growth – transport energy demand slows due to vehicle efficiency;
- As China shifts towards a more services-based economy, much of the growth in industrial production will be located in lower-income countries and regions, including India, Other Asia and Africa;
- Renewables become the largest source of global power generation by 2040, penetrating the global power system faster than any fuel in history; demand for oil grows, before plateauing, coal consumption remains flat.
- Global carbon emissions continue to rise, by 7% by 2040.

My take on that is that, unless something changes and despite the rapid growth of renewables, growing energy demand will continue to drive climate change, with potentially catastrophic consequences.

Another scenario, “**Rapid Transition**”, sounded more hopeful. This brings together policy action across many areas – gains in energy efficiency, a switch to lower carbon fuels, material use of Carbon Capture, and in the power sector a significant increase in the carbon price. This delivers a 45% decline in carbon emissions by 2040 compared to today, but even this is only in the middle of projections that claim to meet the Paris climate goals.

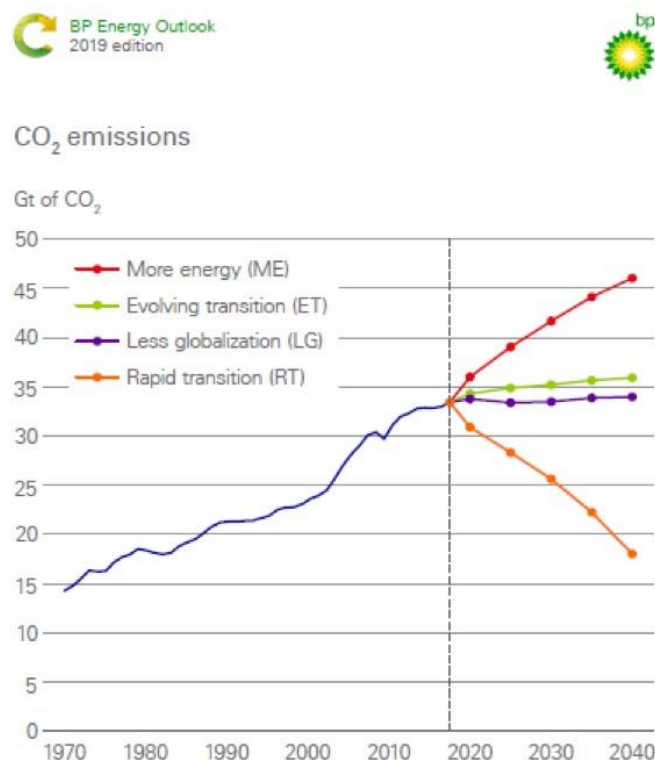
Significant levels of carbon emissions remain, and so to meet the Paris goals, the second half of the century would need to see the near-complete decarbonisation of



the power sector together with greater electrification of end-use, supplemented by greater use of hydrogen and bio-energy.

Two other scenarios, “**More energy**” and “**Less globalisation**” explore different ends of the economic growth spectrum. The former, requiring 25% more energy than the Evolving Transition scenario, generates 28% more CO₂ emissions. Drily the Outlook comments this “highlights the need for further action to reduce carbon emissions”!

“Less globalisation” envisages escalating trade disputes that reduce global GDP growth and hence energy demand. This means 5% less emissions than “Evolving Transition” but growth in emissions only beginning to plateau in 2040. Also there are concerns about energy security that drive more domestically-produced energy (fracking?) and less energy trade. The impact on net energy exporting countries could be de-stabilising. Very little climate change benefit in return for the lack of prosperity and political risk.



Finally, the Outlook considers a “**Single-use plastics ban**”. Even in the Evolving Transition scenario, the use of oil for plastics is assumed to decline due to increased environmentalist pressure. In this scenario, with an increasingly tight regulatory regime followed by an outright ban in 2040, oil demand grows more slowly, but ultimately depends on what alternative materials replace plastic.



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Interestingly, in a classic and impressive way, BP is supporting its communication of the scenarios with **animations** (with more to come). Getting people to “live” alternative scenarios is made much easier if the basic story is supported by some evocative scenario names and illustrations.

Congratulations to BP for using scenarios so well for such an important issue. The implications for the planet are starkly shown, which is at least something that can be used as a call to action.

Written by Huw Williams, SAMI Principal, published 20 March 2019



World Economic Forum Global Risks Report – review

In January, the WEF published its annual **Global Risk Report**. This report describes the results of a survey of the perception of risks amongst nearly 1,000 decision makers across all sectors, as well as analysis of their own. Perceptions of risk are naturally set in the context of prevailing events, though respondents were also asked to consider risk on a 10-year horizon.

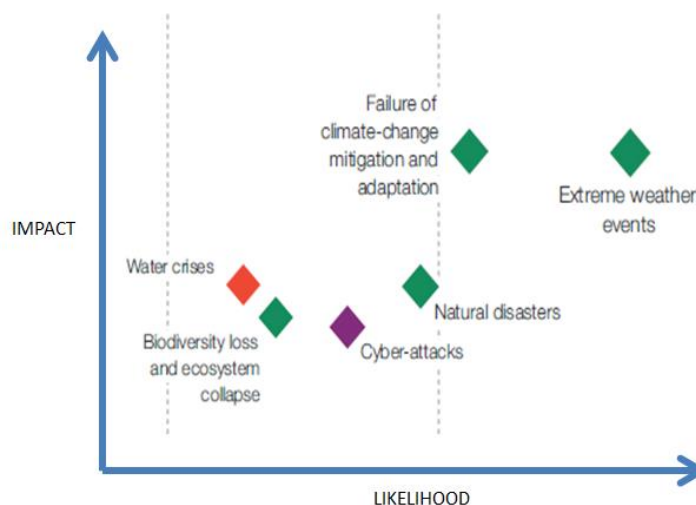
The underlying worldview of WEF may also have had an impact on results. The current trend of “taking back control” was positioned as a threat to global governance (assumed to be an inherently good thing), rather than the democratic, creative force some might view it to be.

Macroeconomic risks and geo-political risks are also seen as current concerns. However, over a ten-year horizon, extreme weather and climate-change policy failures are seen as the gravest threats.

Respondents were asked to rate risks by impact and likelihood. Unsurprisingly, “weapons of mass destruction” had the highest impact, but this was followed by three environmental risks – “failure of climate change mitigation and adaptation”, “extreme weather events”, and “natural disasters” plus “water crises”, which had been classified as “Societal”.

Fortunately, “weapons of mass destruction” was not scored highly on the likelihood scale! The three environmental risks were top, followed by two technological risks – “data fraud or theft” and “cyber-attacks”.

The top right corner of the chart combining the two factors looks like this:





There are also some intriguing charts showing risk-trend inter-connections. The report also shows how these perceptions have changed in the years since the first report in 2009. Coming as it did after the global economic crash, it's perhaps not surprising that 4 of the top 5 by impact and 3 of the top 5 by likelihood then were Economic risks. Chronic disease also scored highly on both factors. Environmental risks started to be considered as important in 2011, but only in the last two years have they taken so many of the top places.

The analytical part of the report addresses four distinct themes:

Power and values: evolving risks in a multi-conceptual world shows how a multi-polar world also has diverging norms and values. It identifies three disruptive trends: how to maintain a global consensus on ethically charged issues such as human rights; challenges to multilateralism and dispute-settlement mechanisms; and states' increasingly frequent use of protectionist policies. These combine to make common global action more difficult – with climate change actions being a prime example.

Heads and hearts: the human side of global risks explores the widespread human costs in terms of psychological and emotional strain. People are becoming increasingly anxious, unhappy and lonely; anger is increasing and empathy appears to be in decline. A common theme is that psychological stress is related to a feeling of lack of control in the face of uncertainty. Mental illness is on the rise.

Going viral: the transformation of biological risks looks at the risks of devastating outbreaks of diseases such as Ebola, MERS, SARS, Zika, and yellow fever. Recent outbreaks (which are increasing) may not have had as much impact as had been feared, but the global approach to dealing with such diseases is not well-developed. Other trends such as urbanisation and migration combine to increase the risk. With the development of bio-engineering the risk of accidental – or even deliberate – release of dangerous pathogens increases.

Fight or flight: preparing for sea level rise. An estimated 800 million people in more than 570 coastal cities are vulnerable to a sea-level rise of 0.5 metres by 2050. This section looks at adaptation strategies being pursued, highlighting the growing prevalence of holistic approaches to flood resilience, including managed retreat.

The report also has a section on ten ***Future Shocks*** such as disruption to food supply and advanced biometric surveillance. These are not predictions but “what-if” thought experiments. Some may be a bit “*out there*” but this sort of exercise is an extremely valuable and generally under-rated element of futures thinking.



2019 Blogs

The Report is a very well-researched document as you would expect, with hundreds of references and examples, and many impactful charts. It is a valuable resource for any foresight exercise. Future Shocks (these and others) are well worth considering. Although the risk “perceptions” section has some potential biases as discussed, it is at least encouraging to see that climate change and other environmental risks are being recognised. But perhaps that is also just a current concern, to be eclipsed in time by something else – what might that be?

Written by Huw Williams, SAMI Principal, published 3 April 2019



Are we entering a new age of medievalism?



Image by Rudy and Peter Skitterians from Pixabay

“People in this country,” said Michael Gove, former minister and now **candidate for leader of Britain’s governing Conservative Party, “have had enough of experts.”** And he certainly seems to have a point. The debate about Britain’s departure from the European Union has been replete with “experts” (the Bank of England, the Treasury, the IMF, the Confederation of British Industry, virtually every employer and so on), almost always on the Remain side. The other side of the debate is notable for its appeal to belief in the country, and a scorn of “Project Fear”. And that side won.

In the United States, the cry of “fake news” drowns out detail. President Trump proposes the shutdown of the National Endowment for the Arts and the National Endowment for the Humanities. On the internet, people who believe that vaccines cause MMR are promoting an anti-vaccine agenda in the face of mumps and measles outbreaks. Experts are derided. Science is ignored. Fact is prey to belief.

We have said before that the seeds of the future are to be found in the present and the past. To try and understand what this move to belief means, let’s look at the time when belief was indeed greater than fact: in the West, the medieval world of the 13th through 16th centuries. There are some disturbing analogies. Here’s a selection.

1. We no longer believe in evidence. People build their views of the world from images created by others, with their own agendas. Paintings become Photoshop; messengers from afar and sermons in church



- become those news feeds we choose to follow because they agree with and reinforce our point of view.
2. Holding contrary views is becoming dangerous, and we cannot risk exposing our young people to the pollution of conflicting ideas. In denying platforms to modern day heretics by, for instance, banning right wing speakers, it's not hard to see iconoclasm and religious persecution.
 3. New technology spreads science and literacy and thought – and rumour and myth and false facts. Others have made the comparison between Gutenberg and Tim Berners-Lee, between the printing press and the world wide web, and they are right.
 4. We are under constant surveillance – or if we are not, we feel ourselves to be. Britain has the highest density of CCTV in the world; China has facial recognition built into (it seems) everything; Google, Apple and Facebook know who you are, intimately – and who your friends are. It's a short step from this real surveillance to the stories of an omnipresent God, who knows all – and judges you for your actions as China's concept of social capital judges you now.
 5. We are dependent on processes we don't understand, cannot control, and for which we need intermediaries. In the Middle Ages, we propitiated against the ever present threats of war, famine, plague and death with our taxes and our tithes to the church; now our interconnected world is intertwined in ways which we are unable to understand or fix, and we pay our government and the private sector to make things work for us.
 6. And of course the ideological schism between faith and fact, between populism and western liberalism, between demagoguery and democracy, finds its comparators everywhere: from the Hundred Years war to the denials of Galileo, from the book burning of Savonarola to the attempted destruction of the libraries of Timbuktu.

The past may be a foreign country, but the map looks awfully familiar.

So is the future a medieval one? Maybe with some aspects of A Canticle for Liebowitz, as outposts of civilisation preserve the learnings of the past into the future? Are we going to see a slow slide back to the pre-Enlightenment?

It is too early to tell. Science and fact is putting up a fight. Under enormous pressure, online media giants are engaging more fact checkers. Candidates for the leadership of the Conservative Party are signing pledges which seem to control others campaigning for them (and hence spreading stories which may, or may not, be true). Billionaires are putting their money into spaceflight – the ultimate scientific endeavour. Whilst demagogues seem on the rise in the West, there is still, for now at least, the chance that elections will return their polar opposites and the dial will swing once again. The battle between fact and belief has returned to the public space: and the last time that happened, it led to the Enlightenment. It is equally possible that what seems like a turning point towards medievalism is in fact populism's last gasp, and the turning point is towards a second Enlightenment.



The first Enlightenment, though, took a century to embed. There is no telling how long the second might take.....

Written by Jonathan Blanchard Smith, SAMI Fellow and Director and Martin Duckworth, SAMI Principal, published 31 May 2019



AI: More Than Human

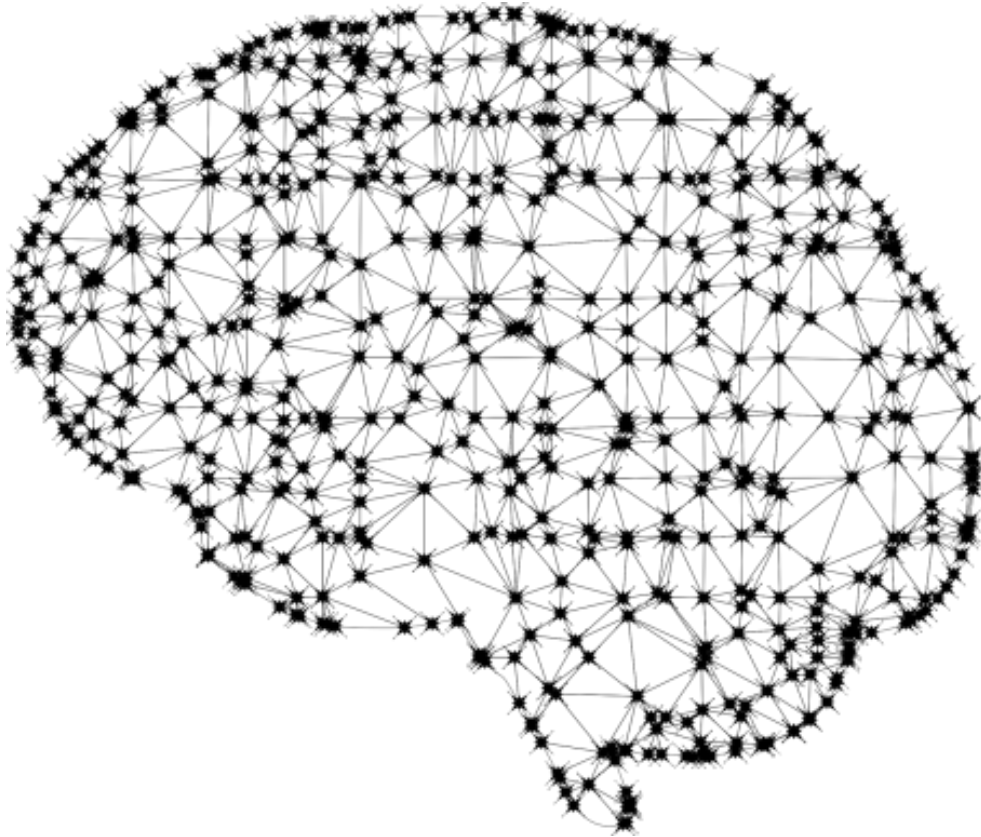


Image by Gordon Johnson from Pixabay

The Barbican exhibition on AI (running until 26th August) is a bold attempt to bring together cultural and scientific history, analysis of current technologies and issues, and examples of possible futures. When I visited it was certainly popular, with lots of young people enjoying playing with the exhibits.

The first section identified how over history there have been many cultural ideas about inanimate objects coming alive. This covered the Jewish **Golem**, Mary Shelley's **Frankenstein monster**, Japanese **Bunraku puppetry**, through to more modern examples like **Blade Runner**.

More interestingly, in the second area, there was an extensive history of scientific thought into artificial intelligence. This covered "**Stanford's cart**", a 1960 attempt at an autonomous vehicle; basic principles such as Gödel's **Incompleteness Theorem**; "**expert systems**" (an approach to AI now largely superseded); and on to a discussion about the **Singularity**, when AI becomes more than human. Unfortunately, because the place was so busy, it was difficult to go through all of the information presented, which seemed very comprehensive.



Another section explained the basic technology of modern AI – machine learning, deep learning, neural networks etc – with a number of interactive displays.

This section raised some of the common concerns about AI: biased decisions because of incomplete data, privacy and security, the relationship between humans and AI systems (empathetic or confrontational). One particular area was the use of AI by the military – autonomous weapons systems. Many people are unhappy with the idea of machines killing people with no human intervention and are now trying to get international agreements to ban such weapons, in the same way as we have bans on chemical weapons – stopkillerrobots.org. This seemed an oddly simplistic area – most people who have any interest in AI will already have come across these questions, and they weren't explored in any depth.

Then there was a display devoted to AlphaGo, which raised the question of what it means to be creative. Does the fact that the system made an unexplained innovative move differ in any real sense from an expert's (detective, surgeon) "gut instinct" – something built up over years' of experience?

A section on the interaction of the biological world and AI explored how one could create environments that mimicked those of history or other planets, and how plant development could itself encode information – "endless evolution". "A-life" explored how bio-mimicry could create new products and challenge ones' perception of what was natural and what engineered. Some of the supporting information seemed over-ambitious however – "changing the nature of time"?

Down in the Barbican Pit was an immersive display – "What a Loving and Beautiful World". Pretty images rolled around the four walls of the room, and by waving at them you could change how they behaved. It wasn't all clear what the point of this was – when asked the assistant explained what it did, but not why.

Perhaps the best example of new robotic usefulness was the "MakrShakr" – an automated cocktail maker, but sadly, I didn't get chance to sample its wares!

Written by Huw Williams, SAMI Principal, published 5 June 2019



The Demographic Time Bomb: How Our Assumptions About Global Population Are About to Go Bang!



Image by Gerd Altmann from Pixabay

It is a truth universally acknowledged that any article, blog or book about population growth should start with Thomas Malthus. This blog discusses a paradigm shift in world population – one which may finally put to bed the theories of the Rev Malthus, although that is far from the most important of the implications.

But let's begin with Malthus. His *Essay on the Principle of Population* (first published in 1798) argued that there is a natural tendency for population to increase rapidly, and that population is held in check mainly by negative factors: hunger, disease and war. He went on to argue in later editions that preventive checks, such as later marriages, could ensure a higher standard of living, and increase economic stability.

At the time of the *Essay's* publication, the population of the world is estimated to have been one billion. Today, the world's population is over 7 billion. Over that period, the theories of Malthus have been kept at bay by rising living standards leading to longer life expectancy, reductions in infant (and maternal) mortality, near-eradication of many serious infectious diseases through vaccination and immunisation, better sanitation, and safer working conditions. The spurt in world population began in Europe and the USA, spreading to the rest of the world. As countries and regions have developed economically, they have acquired the means to ensure a better, healthier and safer life for their people.

The two centuries of rapid population growth have inspired various neo-Malthusian prophecies of doom – initially warnings of hunger and disease; and more recently



warnings of the danger of exhausting the earth's finite natural resources. Population has stubbornly continued to rise, and so have living standards, with billions being lifted out of absolute poverty in the last 30 years, in spite of the warnings of imminent doom. The neo-Malthusians have so far been proved wrong.

Checkmate for Malthus

This argument might continue as we move through the 21st century. But a new book calls into question the most fundamental – and hitherto unchallenged – part of Malthusian theory.

Whilst the world's growing population bears witness of the ability of humankind to keep at bay the checks of hunger, disease and war, it has been generally assumed that the “natural tendency” for population to increase would continue. But the latest evidence shows that this is no longer a safe assumption.

In fact, it has been unsafe for some time, but the population explosion in the developing world, especially Asia, has masked a trend towards declining birth rates. The “reproduction rate” for human fertility – that is, the rate required to keep the population stable, all other things being equal – is 2.1. In 1950 the global fertility rate was 5.0. It is 2.5 today, and the latest UN projection is that it will be 1.9 by the end of this century.

The UN's latest Population Projections, published in June of this year, suggest a median world population figure of 9.7 billion in 2050, and 10.9 billion in 2100. In other words, they see population growth continuing through the century but slowing down. Their lower projection is of a population of 9.4 billion in 2050, remaining the same in 2100 – in other words, in the second half of this century, we might see the end of global population growth.

The population is aging as well. In 1950 the median age of the world's population was 24. Today it is 31. By the **end of the century, the UN projections suggest that it will be 42.**

In their book, *Empty Planet: The Shock of Global Population Decline*, Darrell Bricker and John Ibbotson go much further. They argue that the UN projections underestimate the factors that are driving population growth downwards. They argue that the global population in 2100 will be no higher than it was in 2000 and may even be lower. And the population will be older. They argue that factors such as economic prosperity, female emancipation, and urbanisation are leading women to exercise their right to have fewer children, or not have children at all.



This tendency is most evident in developed economies. Remember, the replacement rate for fertility is 2.1:

- The EU's average fertility rate is 1.6
- The USA's fertility rate is higher than Europe's – 1.9. Bricker & Ibbotson argue that this, together with its relatively open immigration policy (at least for now), means that its population is projected to grow from 345 million today, to 450 million by the end of the century – this is consistent with the UN projections
- Japan's fertility rate is 1.4. More than 25% of the population are of pensionable age. Median age is 48. Bricker and Ibbotson argue that Japan's population will fall from 125 million in 2000 to just 83 million in 2100
- Other Asian "tigers" are following suit. South Korea, Singapore and Taiwan all have fertility rates around 1.2. Bricker and Ibbotson say that in the middle of this century, South Korea is set to overtake Japan as the "oldest" population on earth
- China's population is set to peak in 2030 at 1.4 billion, but the average age will then increase rapidly, and the population is projected by the UN to decline to just over 1 billion in 2100 – Bricker & Ibbotson believe it will fall further – back below 1 billion
- India's population is projected to continue to increase to 1.7 billion in 2060, and then begin to decline

The only region that will buck the trend will be Africa, which is set to grow from 800 million in 2000 to 2.5 billion by 2050, and projected to grow to 4.3 billion by 2100 (according to UN projections). 60% of its population is aged under 25. Increasingly Africa will be anomalous: **it will be the "Young Continent" – as we have previously discussed in our Africa blogs.**

There is no fundamental disagreement between the UN and Bricker & Ibbotson as to the drivers of population change. It is a matter of degree. Bricker & Ibbotson see the downward drivers as stronger than the UN does, and largely irreversible. The UN allows the possibility that countries that seek to do so will be able to raise their fertility rates. Bricker and Ibbotson argue that such initiatives tend to have short-lived success, and that long-term downward trends will then reassert themselves.

But the direction of travel remains the same – only the duration of the journey is at issue. Interestingly, the UN's 2019 projections are slightly but significantly **lower** than the previous set, published in 2017. The trend raises some big questions – both intellectual ones for futurists, and practical ones for business strategists and economists.

- What does the projected decline and aging of China's population do to the assumption that this will be the "Chinese century"? Will China enter the economic doldrums, as Japan has already done?
- Will Africa's population growth and the youth of its population make it a rising economic power, or will it fall foul of those Malthusian "checks" of hunger, disease and war?



- Will Africa's young people be welcomed by the rest of the world as a valuable resource, or seen as a mass-migration "problem"?
- Will the USA, and other countries or regions with open migration policies fare better than those with greater reluctance to accommodate cultural differences?
- Will countries with older populations be less inclined to spend, and more inclined to save for old age?
- Will countries with older populations be less inclined to fight wars, or will they simply fight by other means – drones and cyber warfare, for example?
- Will countries with older populations be less innovative and adaptable?
- Will falling population mean we have a greener planet?
- How will Governments balance the needs of older people with the expectations of people of working age?
- How will technology allow new opportunities to address these problems?
- Will countries seek to persuade (or coerce) women into having more babies? Will they succeed?

These 11 questions are a starter. Increasingly we can expect to see the demographic time-bomb baked into foresight frameworks and scenario planning exercises. And I am sure SAMI will have plenty to say about this.

If he could, what would Malthus be blogging?

Written by David Lye, SAMI Fellow and Director, published 26 June 2019



‘The Beautiful Ones’: Writing about the future: a conversation between O.M. Faure and David Lye



‘*The Beautiful Ones*’ trilogy comprising *Chosen*, *Torn* and *United*, was published on 15 June by O.M. Faure, a Principal of SAMI Consulting. Since publication it has become #1 in Dystopian Fiction, #1 in Action Adventure Travel, #1 in Political thrillers, #1 in Time Travel on the Amazon Best Seller lists. We brought together O.M. Faure with David Lye, SAMI Fellow and Director, to talk about demographics, climate collapse and populism – and on bringing foresight into fiction. The discussion was moderated by SAMI Fellow Jonathan Blanchard Smith.

JBS: Olfa, David, welcome. Let’s start by talking about ‘*The Beautiful Ones*’.

OMF: It’s a series of novels written using real data, and scientific forecasts. My aim was to spark debate and propose ideas to the reader but I wanted to do it in the form of a thriller in order to make it easy to imagine that future, easy to digest the concepts and easy to relate emotionally to the issues that face us.

In ‘*The Beautiful Ones*’, the reader is plunged into 2081, and alongside the heroes, they discover a world with 14bn humans on earth. The global overpopulation has caused water and food shortages, and that future is starting to tip into civil unrest, coupled with environmental catastrophe.

JBS: And I note that Paul Ehrlich at Stanford has said “‘*The Beautiful Ones*’ captures the human predicament through the overpopulation lens with fearless clarity”. David, what did you think?

DL: It’s a really interesting exercise in foresight. It raises many important issues: demographics, environmental catastrophe, populism and racial discrimination. It’s also a really good read, with believable and likeable lead characters



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OMF: I chose to use the high variant of the United Nations population forecast because it's more striking from a dramatic point of view, it makes it easier to see the issue.

I also picked two countries – Uganda and the US which are going to be among the nine most populated countries in the world, by 2080. The US, because of the ongoing curtailment of women's fertility rights; and Uganda, because it is the smallest of the nine in land area and yet will have 209m people in a country the size of the UK, most of which is taken up by a lake. Fiction requires tension and by setting one of the novels in Uganda, I hoped to create an interesting dynamic that would evidence the friction points of high population growth on a relatively small territory.

Research was really important for the books: it showed that the highest population growth between now and 2080 will occur in Africa which will go from 1.2 billion to 4.7 billion inhabitants; whilst Asia still has significant population sizes, the growth is not as pronounced there. Asia will go from 4.3 billion to 6.8 billion and the other continents will remain at or below one billion.

It's the overall, worldwide growth in human population that is concerning though. It raises questions about sustainability, food safety, climate-driven migration and its corollary: rampant racism. And of course, there's the impact of huge additional human numbers which will worsen the climate crisis and threaten biodiversity.

My three regions have three different ways of dealing with the crisis: there is syncretism and blending in continental Europe which chooses to throw its doors open to immigration and to consciously limit the fertility of all its citizens. By contrast, in the post-Brexit 2081 UK, immigrants are no longer welcome and the state prevents people of colour from having children while encouraging white couples' fertility, through legal and fiscal means. Finally, in the US, given current developments, I imagined a more violent future, harnessing technology and genetic engineering to keep down the population of people of colour through sterilisation or extermination

JBS: David, your view of demographics in the future is different from Olfa's. Why?

DL: Looking at the UN projections at the median and low end; large parts of world population growth seem to be slowing or coming to a stop. Population is aging: by the time China reaches 1.4bn, its average age will go from 37 in 2030 to 46 in 2040, and the population is then projected to start shrinking.

I was very taken with '**Empty Planet**' by **Bricker and Ibbitson**: they argue the UN forecasts are too high and pay inadequate weight to factors driving down population,



including urbanisation; access to education for women and girls and access to opportunity in the jobs market.

What's not in dispute is that Africa will be a crucible of population growth – from 800m in 2000 to 2bn plus in 2050 to the UN median figure of 4bn plus in 2100. Bricker and Ibbitson believe that population growth may tail off after 2050. In '*Human Tide*', Paul Morland points out that populations surge with industrialisation and urbanisation, but then go into marked decline.

OMF: No-one knows what the future will look like – SAMI's expertise is to propose scenarios, stemming from the same data points. Looking at the factors that David mentions, urbanisation only reduces population if it is accompanied by better infrastructure. In places where urbanisation is wild – such as the huge slums around Kampala – urbanisation won't necessarily result in increased development and subsequently modify fertility patterns. On the contrary, research shows that this type of urban environment can retain rural fertility patterns.

David's second point: education, is provided by religious institutions in certain countries and so you can have instances where education is offered yet only reinforces traditional fertility patterns. For instance, Uganda is a predominantly Christian country and the Roman Catholic Church is notoriously against birth control and abortion.

Finally, rising prosperity through development may be a myth – for instance, the rising prosperity in Africa is accompanied by a silent colonisation of Africa by China. So although on paper, the country appears wealthier and more developed, in reality, divisions in extremes of income continue and do not benefit those at the bottom of the scale.

DL: This is why foresight is fascinating. All these things are spot on, but we don't know how this will play out. The Chinese Belt and Road Initiative focuses on roads, railways and power supplies, all of which Africa needs, not on the infrastructure of cities. And now, China is Africa's biggest creditor, which implies development will take place in non-western ways, at least in some parts of Africa.

OMF: It needs to be the right infrastructure to impact development. Building a road from the oil rig to the airport may be good for the economy but it is building water pipes and schools and communication networks which will bring education, development and material change for the population that would in turn impact fertility. Development can only trigger the demographic transition if it is accompanied by the emergence of a middle class and the spreading of wealth to all layers of society.



DL: In our studies, I have been placing African countries into three groups: the failed states, where there is long-running conflict, with no immediate prospect of improvement; those experiencing rapid economic progress, such as Ghana and Senegal; and the middle group which has the potential to go into the rapid development group but don't, largely because of poor governance. This group is ripe for exploitation by the Chinese, or others who are willing to turn a blind eye to bad governance.

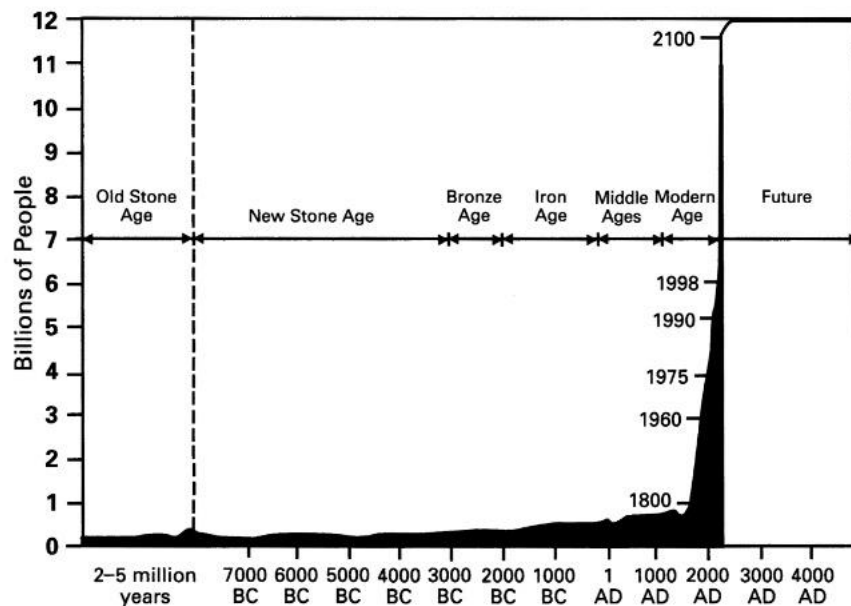
OMF: I want to be very clear that the points I make about overpopulation are not regional, they are global. This discussion should not just be about Africa. In the US for instance, there is a majority in power which doesn't want women to have control over their own fertility. We live in a very pro-natalist society – women without children suffer stigma, there is a curtailment of women's fertility rights; and worldwide, influencers actively reinforce the idea that a "proper" woman has children. But society doesn't take stock of how many people there are in total on Earth. Each country, each religion, each economy that wishes to wield influence is only looking at their own population and trying to increase their weight and impact through their numbers. You need more believers to go from being a sect to being a religion, more citizens to pay for pensions or go to war, more consumers to prop up the continuous economic growth that capitalism requires.

As a result of this fragmented thinking, there is too little discussion on global overpopulation and its impact on the environment. Neither is there a real understanding of the different ways developed and developing countries' growing populations have different impacts on the environment.

JBS: So you're both coming from the same data, from the same direction, but getting very different results.

OMF: The thing that divides us is that you, David, are an optimist and I'm a pessimist. You see the data and foresee all the ways in which it will change for the better whereas I wrote the books specifically to showcase what will happen if we do nothing, if we just continue in the general direction we're already going. I wanted to paint a picture of the consequences of inertia.

World population was consistently under a billion up to the middle of the 1800's. See the graph – it's practically perpendicular. No sign that this course is slowing down. This is clearly exponential growth.

**FIGURE 21-6. World Population Growth through History**

SOURCE: "Population: A Lively Introduction," Joseph A. McFall, Jr., *Population Bulletin*, Volume 46, Number 2, October, 1991, pages 1-43, Population Reference Bureau, Washington, D.C.

DL: About natalism, you're absolutely right. But what are governments going to do if they see their population declining? Whatever incentivisation schemes are tried don't last very long. Enforcement rarely works. You show it well in *'The Beautiful Ones'*, where abortion is punished by death. Look at the US at the moment, where some states are seeking to effectively ban abortion. But government control measures are bound to provoke some response.

The environment is hugely important in your books. Malthus started this in 1798, which is where the population graph began to take off: he has been proven wrong time and again in his assertion that population growth is geometric and food growth arithmetic. But food production has increased geometrically. It's the prospect of negative impacts of climate change that may bring Malthusian ideas back into play.

OMF: The food aspect is very interesting. You see it all over the natural world, when animal numbers expand to meet the available food, then the food runs out and the animal numbers crash.

The "Green Revolution" of the 1960s dramatically increased crop yield and averted the famines that would otherwise certainly have occurred. But, with our numbers continuing to grow exponentially, what will happen if another Green revolution doesn't come along to save us?



What strikes me though is that in all the conversations about overpopulation, people always say that there will be enough to sustain humans, so everything is fine. What about the impact of our huge numbers on our environments? On other species? As Sir David Attenborough says, “Instead of controlling the environment for the benefit of the population, perhaps it is time to control the population to allow the survival of the environment.”

Every environmental issue is compounded by our numbers. Plastic straws, the Chinese switching from bicycles to cars, the consumption of meat by the rising middle classes all over the world: it is completely multiplied by there being so many of us.

DL: We certainly can't go on like this *ad infinitum*.

JBS: We have an author and futurist here, and a foresight expert: let's talk about the roles of fiction and foresight.

DL: Foresight is in part about developing compelling narratives: fiction is an extremely useful tool in foresight.

Fiction allows you to make moral judgements at all levels, whereas foresight as a scientific process allows for ethics but requires a standing back. Foresight needs to be objective, impartial, and scientific towards issues but it would be bad foresight not to recognise ethical issues.

OMF: I have always thought that the business scenarios which allow you to jump into the future person's shoes are very powerful. So one day, I realised I could do something like the first-person scenarios that we use in projects for clients and just expand them.

I thought “Wouldn't it be interesting if we put the foresight tool and methodology in the hands of individuals to allow them to make robust decisions for their personal lives,” and at that point, I realised that it would be best done through a novel.

DL: And of course this is happening: the Gates Foundation, the Half the Sky movement, are all about women's empowerment. Education, emancipation and empowerment of women is what we have to do: it seems to be self evident.

OMF: I agree there is progress. The “Good Club” is another example: It's an association of philanthropists including Ted Turner, Warren Buffet and Oprah Winfrey which is looking into ways to reduce overpopulation while supporting development. Famous environmentalists are starting to speak up about human overpopulation as well: Sir David Attenborough, Dame Jane Goodall, Chris Packham just to name a few.



DL: if you give women and girls agency, the cumulative effect of their choices will result in a lower birth rate.

OMF: Quite right. We were talking earlier about government control of demographics. Fertility-control measures from governments are a slippery slope and inevitably when one speaks about overpopulation, there will be someone who will mention either war or epidemic being a “solution”. But those are morally wrong. There are no silver bullets when it comes to overpopulation. The solution is to start talking about the issue, to start explaining the impact of our species’ numbers on the planet, to allow this debate to even take place.

I am convinced that if people have freedom over their fertility decisions and if the impacts of overpopulation on our planet become clear, individuals will make their own choices in the privacy of their homes, without the need to involve governments. Certainly, it would be a decades-long process to shift the culture but I believe it’s feasible.

My books propose to the reader what happens when we do not get that freedom to choose our fertility, when we do not empower and educate women, when we do not support the economic growth of under-developed countries. I hope the reader will see what this dystopian future would look like and make their own choices about what to do today to prevent it.

JBS: Olfa, David, thank you.

The Beautiful Ones trilogy is comprised of *Chosen*, *Tornand United*.

The books can be purchased from Amazon, Apple, Nook, Kobo, Barnes & Noble and Waterstones. For the links to the different retailers, just follow: <https://www.omfaure.com/the-books>

You can follow O.M. Faure on: Twitter @OM_Faure;

Facebook: <https://www.facebook.com/omfaure>; and join the readers’ club at www.omfaure.com

References of books mentioned in the discussion

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Written by Jonathan Blanchard Smith, SAMI Fellow and Director, published 1 August 2019





Space hotels and Androids: Samsung's KX50 project



Image by Thomas Budach from Pixabay

Foresight is a difficult subject. Scenarios should be grounded in fact, drawing the lessons of today and yesterday out into the future in ways which are genuinely useful and thought-provoking. Weak signals should not be ignored, strong signals acknowledged and accommodated, including if one is lucky a sprinkling of trends, leading to a range of reliable futures backed by evidence.

And somehow, one has to avoid, in long term projections, concepts which smack too much of science fiction – a form of futures thinking that has been around for hundreds of years and which can be remarkably accurate and useful in some circumstances, but not in all. Sci-fi, like so much of literature, situates today's issues in an unfamiliar surrounding, the best to shine a light on it and study it. The concerns of the present are projected, in sci-fi, into the future and given a space where they are unconstrained by today's setting. Foresight is more practical, more grounded in the present, more directly applicable to the now and the future.

Or so one would think. Sometimes along comes a set of scenarios which are a delight. Hopeful, optimistic, accompanied by images which feel like they belong in a science fiction movie. Constrained only slightly by today's conditions, they have been allowed the freedom to roam.

Such a set of futures is in the rather wonderful new paper from Samsung, *Samsung KX50: The future in Focus*. Aquatic Highways! Space Hotels! Androids! Sports involving some kind of flying skateboard/lacrosse stick combination! Anchored by serious thought from very serious futurists, this is a splendid collection of forward thinking, with a range of essays covering Work and Leisure, Transport and Infrastructure, Food, the Future of Cities, Healthcare and Entertainment.



Samsung produced its first television set fifty years ago, and as the introduction points out, it now produces smartphones and technology which would have seemed unthinkable then. The firm has brought together eminent futurists and academics and, though there is an inevitable technology focus, the quality of its contributors is such that that focus does not exist in a silo. These are real glimpses into a future world. One with space hotels.

Some highlights of 2069:

- “Brain implants have totally changed how we interact with our colleagues across the globe” and, distressingly for those of us who are linguists, “learning languages has become unnecessary”.
- AI has replaced “repetitive, mundane tasks”
- 3D printing has effectively killed the transport industry – objects are made locally.
- Truly immersive virtual experiences replace holidays
- “Centralised control by way of governments and national borders [will be] weakened or cease to exist”

And that’s just a start, a brief selection from the first essay.

Elsewhere, transport will be by quad-copters, superconductor buses, subsonic tube systems and reusable rockets. Food will become more local (though we shall be eating insects); water supplies will be more controlled; and “tasty, nutritious, synthetic food” will be produced in our own homes by food printers. Skin embedded devices will monitor our bodies, telling us what we need to eat and when.

We will be living in giant climate-controlled cities under domes in different types of relationships “forming new boundaries of state, nation, sea or planet”. Hydroponics will provide our food and we will grow it in our cities. We shall build underground, and under the sea. Our virtual companions will be complemented by our own in-body implants. Nanomedicine will put an end to cancers. And we shall no longer watch games or films, but directly experience them through our implants, haptic body suits and the immersive and all-encompassing power of technology.

Samsung’s future is astonishing in its ambition and its scope. It is to be commended for the positive approach – this is the world of our ambitions and our dreams.

It is not the world of mass migration, of climate change, of the rise of nativism, but maybe that does not matter, Maybe what matters is that there are people out there, founded in companies that have led the way in the technological revolution, thinking about how technology will be a force for good. Perhaps it is that which will cope with the consequences of the adverse effects we see in the future and, by providing a technological set of solutions, go some way to mitigating them. Perhaps.



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The future, though, is not without its national stereotypes. British readers will not be surprised to learn that, in a survey to accompany the publication of KX50, British people were most excited about one thing. At 63%, it scored a full twenty percent higher than any other of the many benefits of the future. It is, naturally, “Self-cleaning homes using robot technology”. It seems we’ll leave the space hotels and haptic suits to other, more adventurous people – who we will watch from our perfectly clean apartments.

Written by Jonathan Blanchard Smith, SAMI Fellow and Director, published 25 September 2019



Radical Visions of Future Government



Image by Arek Socha from Pixabay

There is something wrong with government. The UK has been paralysed by a single political issue for some four years; there are moves to impeach the US president; the EU is torn between social democracy and Orban-style “illiberal democracy”. China advocates its administrative system, justifiably, as one which permits breakneck development and the lifting of millions out of poverty, whilst Hong Kong is riven by demonstrations against precisely that system. The promise of the Arab spring has in most places collapsed into new dictatorships or civil war. Fukuyama-ist managerialism is giving way to protectionism, globalisation to nativism. It is time to rethink the whole project.

How welcome then that a new study does just that. NESTA, the National Endowment for Science Technology and the Arts, a UK charity which describes itself as an “innovation foundation”, has recently published “Radical Visions of Future Government”, a highly detailed and thoughtful look at ideas, concepts and approaches to public administration.

Building on a number of previous NESTA foresight projects, including in health, education and local government, the work, across some 170 pages, addresses future trust, future roles and future mindsets, featuring “essays, provocations, thought experiments, fiction, speculative design and original art”.

Future roles examines “how the roles and skills of public sector staff, politicians and citizens will need to change to meet the challenges of the future”. A delightful grab bag of ideas, this section covers everything from better communication to an update of the 1854 Northcote-Trevelyan Review; and crowdsourced opinions from public servants. Creative, thoughtful contributions take the form of a scrapbook of documents from 2030, where public servants are now “creative facilitators” helping climate change damaged communities live better locally; to the



excellent *Sacrosanctuary*, a feasibility study for a country for refugees. The opportunity to start from scratch, to develop the basic principles of a new state, is an opportunity the author, Vik Sasi, grabs with both hands, in a careful act of thoughtful reinvention.

Future mindsets looks at some of the ways we may be able to think better in the future. Steering the fine line between practicality and utopianism, pieces of speculative fiction examine the macro (government and society in 2030) and the micro (Waltham Forest). The latter contains interesting lessons for wide-based participatory futures work, taking foresight away from the workshop and into the community, and has some powerful writing which could play an important part in driving forwards social-based futures thinking. Dystopian, idealistic and engaging contributions include a board game, and essays on government innovations including a rather lovely piece on devolution or “co-governance”.

Of course, thinking about a future mindset implies that the current mindset needs to change, and Schlimm and Chabeaux’s piece *The Others* argues that “a radical vision for future government is futile without also considering fundamental changes to the underlying economic system it exists alongside”. In a collection of work as wide-ranging as this, it is right to include a piece which comprehensively reworks the very model of government itself. The danger of straying into high politics is not avoided, but it is refreshing to see a thorough reworking of the concepts of government themselves.

The third section, Future Trust, “deals with questions about what would it take to reinvigorate democracy, trust, and citizens’ relationship with their government”. Covering government use of data, reform of Parliament, AI regulation and a wholesale reworking of the very concept of government itself, this is perhaps the most important, yet most challenging section. It comes with some clear underlying concepts of what is “good” as far as government is concerned – democracy, citizen involvement, devolution, localisation – and I would have liked to see some clear explanation of why these particular principles are seen as good in themselves – over, perhaps, the Chinese, Scandinavian, or even the old one-nation Tory, models. A danger in foresight is that elements get baked into the foresight process from the outset, and in a work as radical and useful as this one, the opportunity to overturn the whole process and start from the very beginning is one which is only really taken by Sasi in *Sacrosanctuary*.

After 170 pages of dense, thought through, engaging work, what have NESTA given us? Firstly, congratulations are due. The breadth, sweep and sheer flair of delivering such a comprehensive review is an achievement in itself. *Radical Visions* shows us that there are ways of imagining the future which are positive and possible. The range of voices, and of viewpoints, is encouraging and refreshing (and has the major



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advantage in a work of this length of assuring that it doesn't get boring). The mix of politics and practicality is useful; the clear underlying assumptions perhaps less so. In his foreword, Tom Symons, NESTA's head of government innovation research, says that their intention is that *Radical Visions* "helps to provoke a debate" about the "questions of genuine importance as we embark upon a new decade of government and public services". Job done. It is now up to those people who make decisions on our behalf to engage – and that, I suspect, is where the hard work really begins.

Written by Jonathan Blanchard Smith, SAMI Fellow and Director, published 10 October 2019



New Scientist Live 2019 - a Review



Image by Free-Photos from Pixabay

After spending two full days at this year's event, I was reminded of a quote from Mark Stevenson's 2011 book (*Stevenson, Mark, "An Optimist's Guide to the Future", Profile Books, 2011, p. 284*) on the future:

"... society is built on top of our infrastructure, not the other way round."

In other words we must work out from where we are, not try to create some brave new world out of thin air. This year's talks once again covered a huge multiplicity of topics including stem cell technology, quantum physics, artificial intelligence, agricultural science, nanotechnology and space science (to give examples from the ones I attended) as well as much else. Not surprisingly, perhaps, I felt that those that addressed more directly the issues of our time were long on context and questions and short on the much-needed answers. Yet the green shoots of solutions were to be glimpsed.

For example, Pearce Keen of Moorfields Eye Hospital in discussing how artificial intelligence was aiding the battle against eye disease (nearly 10% of NHS appointments are eye related) used chess as an illustration. There had been a great sensation when Gary Kasparov, the world chess champion, had been "beaten" by IBM's Deep Blue computer, but as Kasparov himself had subsequently pointed out, the use of this A.I. had led to augmented chess players, younger players were becoming grandmasters, and the pool of expertise in the game was becoming wider geographically. So with health care. The use of automated deep learning systems in scanning for eye disease meant that non-qualified people could play a role, and this increased pool of people would help generate new ideas for new applications.

(Mr Keen, of course, stressed that all new developments would require robust clinical validation.)



Geoff Sim of the University of Edinburgh Global Academy of Agriculture and Food Security addressed the question of sustainable food production for the 11 billion people projected to inhabit the planet by the end of the century. One key aspect was livestock. Meat production had grown by a factor of six in recent times, and this wasn't sustainable. Yet livestock products were important for the growth of children, and there was a role for cattle on land that could not be used in other ways to generate food for direct human consumption. Efficiencies could be gained by the combination of farming and forestry activities. But a particularly interesting point made by Professor Sim related to the worrying fact that livestock are responsible for 12% of GHG emissions. I have never before come across any attempts to neutralise these, but lo! – pun intended – it's being done in the development of methane inhibitors. A paper published in the Journal of Dairy Science in August, 2018 states that a novel methane inhibitor feed supplement, 3-nitrooxypropanol (3NOP) reduces emissions in some cases by up to 85%, although the efficacy varies widely. (A later paper claims that further research broadens the possibilities for using 3NOP in the dairy sector worldwide.) A development like this that could be operated at scale would be a breakthrough indeed.

(In parenthesis, associated with the Edinburgh Global Academy and other talks was a substantial exhibition section devoted to the Future of Farming, and one of the exhibitors in vertical farming was demonstrating that the use of specific lighting could increase some yields by a multiple.)

This was set into further context by the talk on soil from John Crawford of Rothamsted Research, home to the oldest continuing agricultural field experiments in the world (started in 1843). Soil was the earth's regulating plant: it broke down the dead stuff, used the carbon for energy and regulated the climate. It was also the most complex biomaterial on the planet, and could do more things simultaneously than the brain. But about one-third of the earth's soil was degraded or severely degraded. We needed to improve the health of the soil in the next ten years, and ultimately needed to produce 30% more food. Considering the possible ways of doing this, he pointed out that it was global companies that had the governance structures to act quickly and at scale.

If the presentations in the halls offered some encouragement, a further issue was how to reach a wider audience. Step forward AlphaGalileo News, one of the exhibitors. In operation for over 20 years, it was created to provide the research community and the media with an effective and independent source of research news worldwide. Their coverage included science, medicine, technology, social science, humanities, arts and high-tech business. They have just opened up the service to members of the public interested in research news because "there are a



lot of interesting articles on our site which should be made available for public consumption.” It is available for a very modest subscription.

I shall conclude with one of the other exhibitors, Plastic Oceanic. At first glance, it looked nothing more than a small stand selling trinkets made from reclaimed plastic. Far from it. They clear Cornish beaches of plastic, and recycle what can be recycled. The rest is ground down and used for their gift products. The surplus goes back into further cleaning up the beaches. The founder turned out to be a town councillor from Falmouth, who was also a marine biologist and deep sea diver. He had rather greater ambitions, and pointed out that plastic that couldn't be recycled conventionally could be ground down and used with a binder to make solid products. He was talking to a railway company about compacting the plastic for use in railway sleepers. While I was talking to him, groups of schoolgirls were inspecting the stall and making “environmentally sound” purchases.

Which brings me to my final point. A substantial minority of the attenders were parties of schoolchildren, and once again a good many activities, including some of the talks, were aimed at them. Such stimulating experiences were not on offer when I was at school: seeding the brains of the generation to come in this way is by itself a major step forward.

Thirty-five years ago, I attended a major conference of information professionals at which Sir Monty Finniston, the former Chairman of the British Steel Corporation, made the statement, “We know the answers: what are the questions?” In other words, how do we get to the solutions that must be out there? To return to my opening point, how do we tweak our existing infrastructure to allow those solutions to emerge. Perhaps that could be a topic for next year's event.

All the talks are available to subscribers to *New Scientist*.

Written by Tony Diggle, SAMI Associate, published 30 October 2019.



ESPAS 2019 - Challenges and Choices for Europe



Image by Peggy und Marco Lachmann-Anke from Pixabay

This ESPAS (European Strategy & Policy Analysis System) Conference took place in Brussels on 14/15 October. As ever, the Conference was packed full of excellent presentations and panels. This is a summary of six key themes that emerged over the two days.

The Rise (and Limits) of Populism

Last year's ESPAS, coming just six months before the European Elections, was marked by uncertainty about how well populist and nationalist parties would perform in those elections. This time, the Conference had the benefit of the results. The populists had not stormed the gates. However populism remains a force throughout the world in many different guises:

- both unelected and democratically elected leaders;
- both social and state-controlled media (and the suppression of minority and/or non-populist views); and
- political and religious and other groupings.

We are seeing opposition movements and demonstrations in all parts of the world against Governments by groups seeking greater autonomy, fairer wealth distribution, better governance, or action against environmental damage. Populism may not have captured the European Parliament, but it hasn't gone away either.



The Climate Emergency

The climate agenda has seen its profile raised by a combination of factors: the latest IPCC Report on the impact of global temperature increase of 1.5% or more; Greta Thunberg and the “children’s strikes”, the rise of the Extinction Rebellion Movement across the World – where populism meets Green politics – and, in Europe, the strong performance of Green Parties in the European Elections.

At ESPAS, we heard from Hans Bruyminckx, Executive Director of the European Environment Agency, that we *can* still save the planet, but that incremental steps based on improving efficiency will no longer be enough. Transformational change will be needed, involving

- systems thinking: eg vertical agriculture, factory-produced meat, changed lifestyles, and
- a shift in financial and investment patterns to underpin these radical changes.

Speaker after speaker hammered home the same message: time is critically short, and the time for action is now. And that action needs to be radical and transformational, not incremental and opportunistic.

Is the World Multipolar or Polynodal?

Whichever it is, the world is changing fast. As at last year’s Conference, a lot of attention was given to the USA’s current trajectory away from existing institutions and agreements, and China’s spectacularly rapid rise, and ambiguous approach to rules governing trade and intellectual property. While these two remain the two great economic and (increasingly, as China arms itself) military powers, there remain other global nodes – including regional and local disruptors: some of them on Europe’s own borders.

The EU continues to believe in international institutions, and a rules-based system focused on values of openness, democracy and freedom. It is seeking to draw together other global allies in this view, on the basis that, even if America and China are bigger than the other powers, they need to trade and collaborate with the other powers. Recent trade deals with Canada and Japan, and with the Mercosur group of South American countries, reflect in part the EU’s desire to work with other States and regional blocs to nurture and uphold a rules-based, collaborative agenda.

The Economic Outlook

Looking to the economic horizon, Europe seeks to keep close to China and the USA. A particular issue of concern at this year’s Conference was rising inequality in many forms:



- inequality within States and national economies, which can fuel populism and nationalism;
- inequality between the generations, which is also a potentially polarising political force
- inequality between regions
- as well as economic inequality, unequal access to resources, including basic resources such as water.

Whilst the 4th Industrial Revolution offers huge advances in technology and other areas of science, major economic disruptions remain a fear, and could form a vicious cycle with populism, threatening political and social stability.

Conflict

There was a widespread sense that the period of relative peace that accompanied the end of the Cold War and the “New World Order” has now come to an end. There is increasing conflict in many regions of the world – involving States in parts of Eastern Europe, the Middle East, parts of Africa, and internal dissent and repression of minorities in many States beyond those conflict zones. Religious conflicts, demands for regional autonomy, and suppression of minorities are a continuing threat to peace. Asymmetric and cyber forms of conflict indicate an era of continuing “unpeace” in many regions.

The Conference heard that in a polynodal world with rising levels of conflict and populism, “power” will ignore the rules. Some speakers advised the EU to increase its military spending, not because the USA had asked it to, but for its own sake. But most important is the prevention and resolution of conflict, wherever possible.

Foresight

The issues above add up to a testing agenda. The rise of a polynodal world and the decline of the New World Order signal that more surprises – both welcome and unwelcome – can be expected. As futurists, we were delighted to hear from *Maroš Šefčovič*, the Commission’s Vice-President Designate for International Relations & Foresight, that the Commission is committed as never before to developing foresight as a tool to help it develop its strategies and policies for this uncertain and unpredictable future. His personal commitment, and that of other, senior Commission members and officials, was very encouraging.

Looking to that future, some other issues that are not yet at the top of the agenda, but probably will be, include:

- Demography – the prospect of the populations in many regions (including Europe itself) aging and beginning to decline in size, whilst Africa’s population will grow fast and remain youthful. Will this mark Africa’s emergence as a



strategic and economic power as the century progresses? Will countries with aging populations covet Africa's young people, or seek to exclude them?

- Values – Europe sees its values as a strength. Others may disagree. In some parts of the world including, but not only, Africa, those values are compromised by a colonial and post-colonial history in which the “rules” seemed to favour the “haves” over the “have-nots”. And might the economic outperformance of Europe by China, and others, call into question those values?
- The rising power of non-state actors – global technology companies, international banks, wealthy individuals, and other movements – terrorist networks, religious and other affinity networks. Can a reformed world order encompass these non-state actors?

In blogs to come, we will look at the key themes of ESPAS, and keep an eye on the three areas for the longer term.

Written by David Lye, SAMI Fellow and Director, published 6 November 2019



How UK is adapting to the New Energy Future

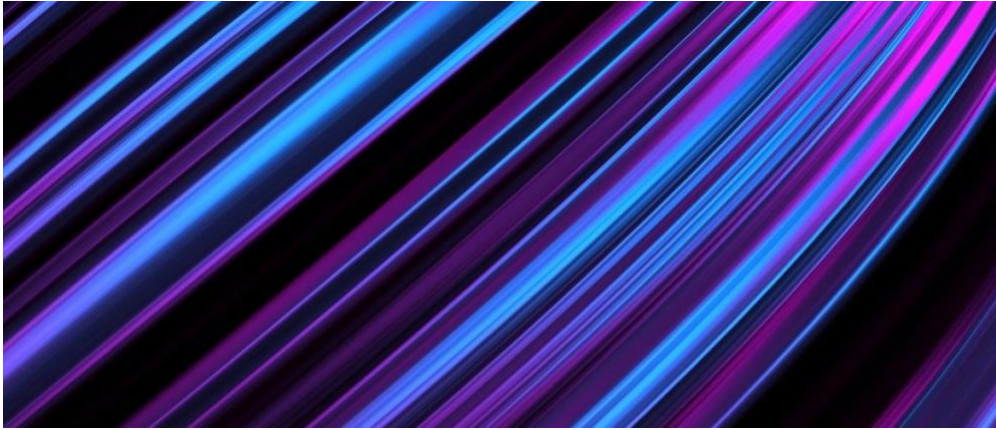


Image by 3D Animation Production Company from Pixabay

Throughout the year, the Natural Resources Forum a leading independent think-tank for the resources sector, holds forums and breakfast seminars at the London Stock Exchange. These seminars bring together senior representatives from investors, corporates, advisers and academia to discuss issues of relevance for sustainable future growth.

In October, the NRF breakfast seminar was on the subject of how the UK is adapting to the new energy future. Industry professionals from leading companies, finance professionals and academics met alongside board directors, advisors and investors to review progress, opportunities and problems as the UK transitions to a low-carbon economy.

Concerns ranged from the financability of projects to the speed of delivery, to the balance between long term success and short-term wins, to prioritisation and opportunities. Here are some highlights from the seminar, which is conducted under the Chatham House Rule.

The importance of the transition to low carbon

Energy transition is nowhere near fast enough to meet the Paris climate change goals.

DNV-GL's *Energy Transition Outlook 2019* projects at the current rate of change, global warming will exceed 1.5% by 2028, by 2048 exceed 2% and by 2100 exceed 2.4%. Other participants were more pessimistic, estimating global temperature rise of between 3.5-4% by 2100. Whilst energy demand could peak in 2035, it would be caused not by a drop in demand but by an improvement in energy efficiency.



Access to electricity is key in achieving the UN's Sustainable Development Goals: 2.8 billion people do not have access to clean cooking fuels 1 billion people have no access to electricity at all. How do we engage with the people who this is going to affect? 2.7 million people in the UK are in fuel poverty.

But over the past 10 years, there has been a complete attitude change. *Blue Planet* and Greta Thunburg both have far greater impact than government policy.

Financing the transition

There are a multitude of pathways to Paris, of realistic and unrealistic scenarios. To achieve a carbon neutral world, \$110 trillion of capital needs to be deployed by 2050. In the UK, 85% of homes today are heated by gas. The Liberal Democrats, for instance, have committed to a policy which means no more use of gas in homes – but to do that in their time scale means 1 million homes per year need to be converted, which will cost £300 billion in the domestic market alone.

Energy is a political football, and that makes financing difficult. Especially, rules on funding and recouping investment are not helping and need to be re-examined so that, especially, solar and onshore wind become more attractive for private sector finance.

The impact of government policy

There was a genuine welcome for the UK government policy of moving to net zero in 2050 – because it gives business nowhere to hide. The role of government is essential in this process – but is frequently complex and confusing.

For instance:

- How do we deal with infrastructure decisions? Hard to divorce them from a more centralised government steer. Town gas went to methane in the 1960s. It only took 10 years, but it needed government intervention.
- Government is providing 15 year contracts but the economies of solar have a return on asset life of 30 to 35 years: what happens after the conclusion of the contract?
- Energy efficiency in buildings is the number one priority: but how do we resolve home heating in light of the UK's housing stock?

Some bodies, like the Energy Systems Catapult, offer ways forwards: “it is a skunk works and living laboratory. It is helping us understand the difference between persuasion, regulation and instruction”.



As governments include younger people, and as the older generation moves on, there will be an increased acceptance of the need for regulatory change: “There’s a clear generational divide on the importance of climate change across Europe.”

Sectors

There’s a minefield of robust and less robust business models in the sector. Whilst the costs of renewables are actively decreasing, each sector has its own issues and advantages.

Oil particularly poses a problem. It is a manufacturing feedstock, a very difficult to transition away from. Solar is increasingly cheap (the Portugal auction price for solar is 1.5 cents per kilowatt hour) but more difficult to finance. There is an enormous cost advantage in offshore wind, but it is difficult to fund onshore wind without subsidies. Nuclear power was seen as “very key” to the transition – but participants acknowledged the public relations issues.

An interesting problem is posed by energy storage. Whilst there have been significant improvements, the short term frequency response market is a problem as is the day market: there is a real need to engage with the technology.

Resourcing the transition

Technical innovation requires more rare earths and copper. The UK could consume half to one full year of the world’s copper to electrify our vehicle fleet.

How do we pay for the extractives requirement for copper and rare earths? And how do we spread the understanding of mineral scarcity? It is unlikely in the short term that nickel, cobalt and copper will ever correct after 2023: at least unless unexpected on planet resources are discovered or asteroid mining becomes a reality.

Improving efficiency

Improving energy efficiency is important to the energy transition. “Home insulation makes all of this work”. Outside the UK, the developing world can take advantage of technology leapfrogging and move swiftly to net zero, taking advantage of technology learning factors to build in efficiency from the outset.

Written by Jonathan Blanchard Smith, Fellow and Director of SAMI Consulting, and chair of the Natural Resources Forum breakfast seminars, published 29 Nov 2019.



2019 Review



Image by mohamed Hassan from Pixabay

Well, what a year! In our December review last year we said “2018 feels as if it has been so exceptional” – but it was nothing like as exceptional as 2019! The biggest election victory since the 1980’s. Take your seats for 2020!

From Theresa May’s Brexit deal being voted down again, past a missed March deadline, on to a leadership election, via deliberately losing the Government’s majority by sacking many MPs, another missed deadline, to the bizarre sight of the Opposition voting to keep the Government in power by refusing to vote for an election under the Fixed Term Parliament Act. And “finally” to the General Election, though as we pointed out in blogs in [February](#) and [October](#) there’s nothing “final” about the Brexit deal.

We had elections for the European Parliament – including the strange position of British MEPs standing on a platform of not being there. Generally we noted that turnout was at historic highs, Nationalist and populist parties did less well than expected, though traditional parties are in trouble and the ends of the spectrum are confused.

Elsewhere in the world, it has been the year of demonstrations. Hong Kong, Chile, Bolivia, Catalonia, gilets jaunes, Indonesia, Haiti. Is there a common theme? A trend or just a series of random events? And Extinction Rebellion everywhere. We’ll return to this in 2020.

Which brings us to the climate emergency/crisis, becoming more front and centre of debate. A change of language from simple friendly climate change. A Swedish schoolgirl dominating the news bulletins, telling off her elders at the UN. A genuine shift in attitudes, but as yet little or no action, and now a worrying acceptance that we are unlikely to keep the rise in global temperature below 2°C.



And SAMI's year? We've continued to work closely with the European Commission. For EU-OSHA, the European health and safety agency, we completed our work on the impact of developments in ICT on the workplace by running scenario workshops in Ljubljana, Oslo and Bucharest. Then, as foresight moved more centre stage in the EC's planning, we supported the Research and Innovation Directorate in developing a scenario approach to building R&I relationships with different regions of the world.

SAMI continued running a project on Building Resilient Households with an emphasis on income shocks and how families can prepare for them. This led to SAMI Fellows Richard Walsh and Alan Woods supporting The Financial Capability Resilience Task Force as it launched its latest report in the House of Lords.

Richard also led work on the digitalisation of medical records (Electronic Health Records – EHR) for the Chartered Insurance Institute. This reached a key milestone in July with the publication of the report "Shaping the Future of Medical Records and Protection Insurance". This was very well-received. Munich Re highlighted the "insightful recommendations" and saw an opportunity to unlock market changing innovation.

We were proud to be awarded a place on Government Office for Science Futures Framework contract, with very high scores, particularly for "Skills and expertise in Futures and other technical areas". This positions us to take advantage of an increased interest in Foresight in Government circles.

We continued to provide training in Horizon Scanning, Scenarios and other foresight techniques, both as a 2-day public course and various in-house bespoke sessions.

Patricia Lustig (SAMI Associate) and Gill Ringland's (SAMI Emeritus Fellow) new book, Megatrends and How to Survive Them : preparing for 2032 , published by Cambridge Scholars Publishing in November last year, continues to sell well. The focus in the book was on global megatrends that would play out during the time span of an organisation's planning.

SAMI Fellows and Principals continued to travel widely giving a variety of foresight talks.

- David Lye sat on a "Question Time"-style panel discussion at the European Commission Research and Innovation Day in Brussels on 24 September, alongside members of Europe's "Great and Good". The discussion ranged across the uses of foresight in business and industry, synergies between



national government and EU foresight, and lessons from the Global R&I scenarios project, which SAMI is currently leading.

- Fellow Jonathan Blanchard Smith chaired the Natural Resources Forum breakfast seminar on “Preparing the UK for the New Energy Future”. He also presented post-Brexit scenarios to Chartered Quality Institute branches in London and Thames Valley.
- Professor Paul Moxey gave talks on delivering training on strategy, risk management and corporate governance for corporate secretaries, and on “Recent corporate governance scandals: what can we learn from the collapses of Carillion, Patisserie Valerie and Interserve?”
- And SAMI Principal Olfa Meliani, writing under her pen name OM Faure, launched her action-packed and thought-provoking futurist fiction trilogy, *The Beautiful Ones* – available from Amazon.

We also, after some travails, re-launched our website in a more visual and mobile-friendly style and continued publishing weekly blogposts, including series on Megatrends, Africa and the Climate Crisis.

We’re looking forward to an even busier 2020 – get in touch if you need some help developing “robust decisions in uncertain times”.

Written by Huw Williams, SAMI Principal, published 18 December 2019