



WHEN THINGS DON'T  
ALWAYS WORK OUT THE  
WAY WE HOPE!

# UNINTENDED CONSEQUENCES

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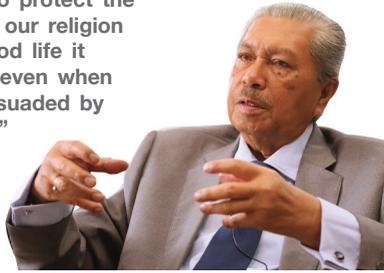
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“We have to protect the essence of our religion and the good life it promotes—even when we are persuaded by technology.”



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Key components of myForesight’s mission are intelligence, research, competency framework and community engagement. myForesight® raison d’etre is set out to accomplish the following:

1. Anticipate Malaysia’s future possibilities;
2. Promote foresighting at national, sectoral and corporate levels;
3. Identify key technologies to support sectoral development;
4. Outline key future R&D areas.

## ● EDITOR'S NOTE



**RUSHDI ABDUL RAHIM**  
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# Initial Thoughts

## GREETINGS & SALUTATIONS,

I hope it is not too late to wish you Happy New Year. As we usher in the new year, I look back at a number of things that were said would and could happen by 2020. Yes, technological advancements were exponentially rapid, and several trends of the past decade were correctly predicted many years ago. However, some are moving in the predicted direction but missed the 2020 timeline.

Yet, I read with keen interest an article published by CNN titled “The predictions for 2020 we got horribly wrong” and it gave us some food for thought about things experts predicted and missed.

Are we able to do better now? In the era of big data, machine learning and artificial intelligence, some say we are better equipped to predict what's coming in the future. But I do believe that more data doesn't always equal better predictions.

There is a need to differentiate signals from the noise—extracting key information from a mass amount of data. Furthermore, there are staggering numbers of interrelated factors that could influence development towards the future. I think, it is therefore crucial that, even if we use technology to wade through huge masses of data, there is still a need for human intervention

to oversee the analysis and consider whether there is a plausible causality. Unfortunately, many people don't realise this. Instead, they try to get more and more information variables and data sets to draw predictions from, and believing that it will make predictions more accurate.

However, I think by now we have made it clear that at **myForesight®**, we have never been in the business of predicting what the future will be. That is not “foresight”. We work on the basis of looking and exploring future possibilities to ensure that we are better prepared.

This preparation includes having people and organisations we work with to look at the unintended consequences as things don't always work out the way we expected. Unintended consequences are outcomes of a purposeful action that are not intended or foreseen. The term was popularised in the twentieth century by American sociologist Robert K. Merton.

At MIGHT and myForesight® - though we encourage technology use and adoption for industry development and societal well-being, we also look at the unintended consequences of technology development and use.



Predictions are very difficult, especially about the future.”

**Niels Bohr**  
Physicist

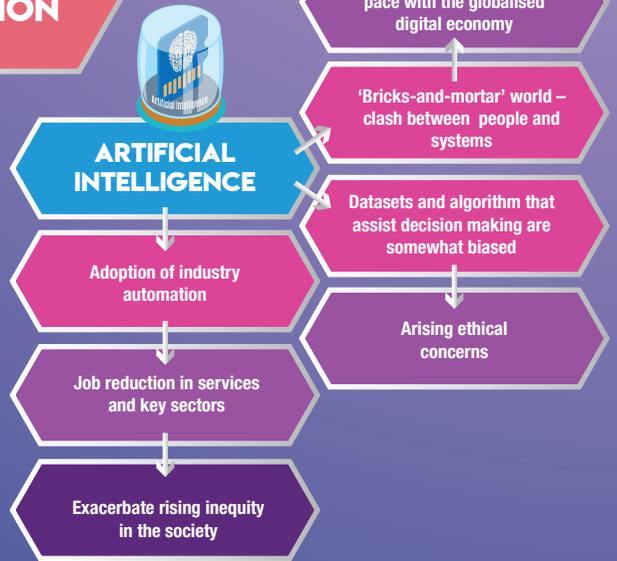
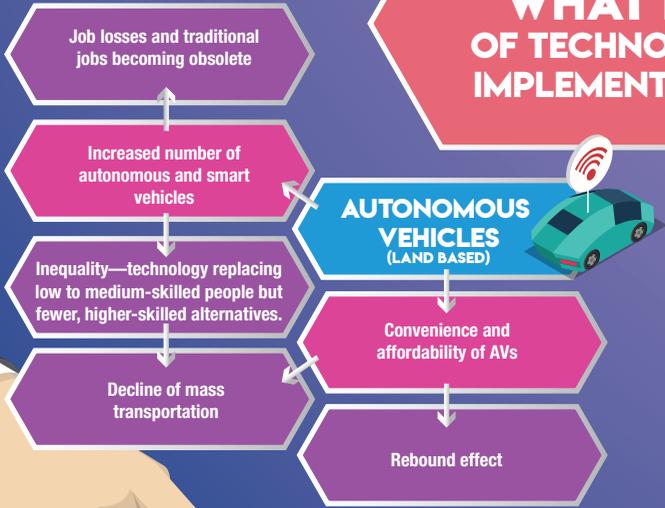
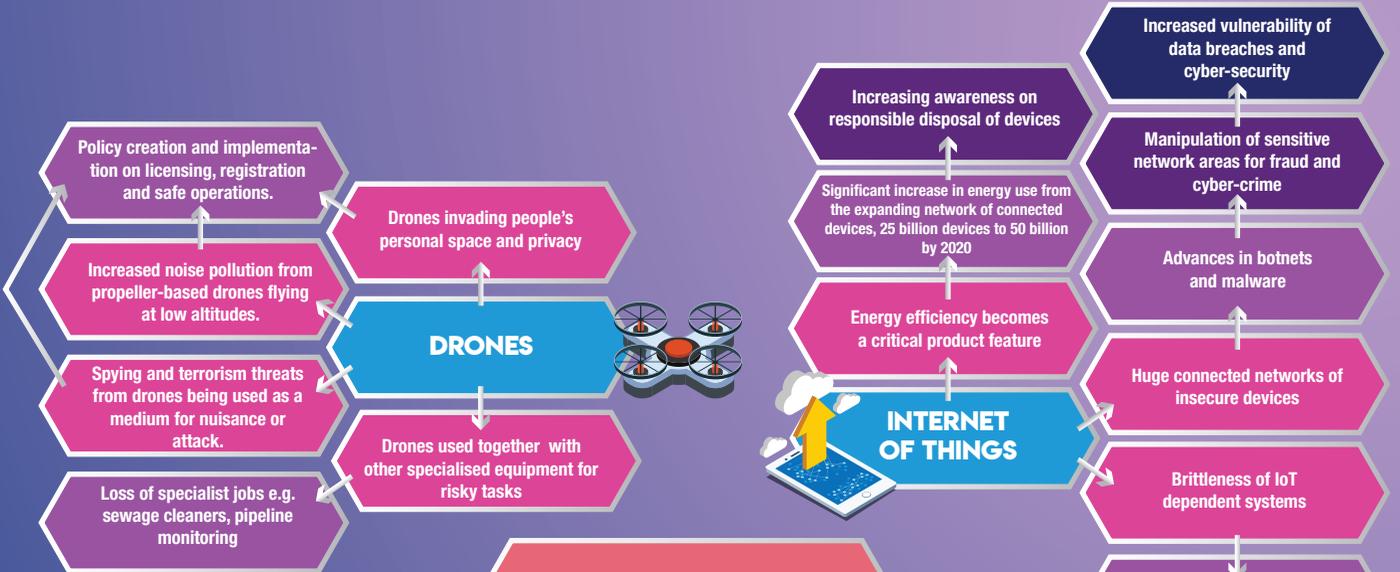
Some of the obvious concerns regarding unintended consequences are already being discussed here at MIGHT. Of these, the discussions include but not limited to the following: -

- Deployment of automation leading to a reduced number of jobs across selected industries;
- Ethical concerns on the use of AI that could lead to bias and discriminatory decision making;
- Vulnerability of IoT dependent systems to a network that could be subjected to data breach and cybersecurity concerns; and
- Personal space and privacy concerns over use of drones.

Anyway, we have dedicated this whole edition to unintended consequences. I hope this will spur further discussions and make for an interesting read.

As usual, I sincerely hope the magazine provides you with some food for thought as you think about your future. We would also like to hear your thoughts. Comments are encouraged and most welcomed.

# THE 'WHAT IFS' OF TECHNOLOGY IMPLEMENTATION



● IN PERSON WITH

# YABHG TUN AHMAD SARJI ABDUL HAMID

*Chairman,  
Institute of Islamic Understanding Malaysia (IKIM)*

“

We have a whole suite of new technologies across various sectors—communication, agriculture, engineering and many others with the ability to drive change.”

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In a career that spans well over four decades, YABhg Tun Ahmad Sarji Abdul Hamid has dedicated his whole life to the country's nation building causes. Having served a number of high-profile roles, YABhg Tun Ahmad Sarji reached the pinnacle of his career as the Chief Secretary to the government. At the same time, Tun Ahmad Sarji was also the Secretary to the Cabinet and the Head of the Public Service sector. During his storied public service tenure, Tun Ahmad Sarji led by example, demonstrating humility and unwavering commitment to improving the sector. With the courage to take action on future driven insights, Tun Ahmad Sarji has greatly contributed to the improvement of processes and systems that have enabled a coherent people development strategy. In this edition of **myForesight**<sup>®</sup>, we recently caught up with the colossal figure to share his experience, views and wisdom on Islamic futures thinking.

## EMBRACING TECHNOLOGICAL INNOVATION

Technology is the application of scientific knowledge for practical purposes. In the industry, “disruption” is disturbance or problems that interrupt an event, activity or process. There are many kinds of technologies we can talk about. We have a whole suite of new technologies across various sectors—communication, agriculture, engineering and many others with the ability to drive change. By and large, technology has enabled many sectors such as retail, manufacturing, medical, education, publishing, transportation, tourism and media to renew their advantage.

Meanwhile, the term “disruptive technology” has not been disputed much. Despite gaining widespread traction, the term refers to technological innovation with the capacity to significantly alter the way businesses, industries and consumers operate. In essence, a disruptive technology has three main attributes. Firstly, the technology displaces an older process, operation, product, procedure or habit. Secondly, it is often viewed to be superior to the older technology it replaces. Third, the technology is usually developed by upstarts or new entrants.

Let's take information technology for example. We are now living in a borderless world and this has led to the creation of speedy dissemination of information. Long before the term was coined, Alexander Graham Bell's

invention of the “electrical speech machine” in 1876, which brought ground breaking change in the way people communicate, where physical distance was no longer a barrier for direct communication between people is an example of disruptive technology.

The invention of the humble “telephone” was the beginning of all the tech frenzy happening before our eyes now. Today, a smart phone is not only used to communicate, but is also used for a multitude of tasks, including financial transactions, photography and monitoring health data. Now, a company called Kardiac Mobile can instantly detect atrial fibrillation and heart rhythm with a 30 second ECG. Its customers can mail the report monthly and share it with a doctor for monitoring. The device has unlimited cloud storage of the ECG recording.

And then, there are unintended consequences of technology development. For example, the influence of social media and rapid communication

on one hand have brought about so many changes. But on the other, the unintended consequences are also worrying. The spread of fake news, fitnah, producing false figures or images of people, which to me, pose damaging threats to the society's morality. At this point, it is critical to think ahead of the unintended consequences technology can unleash to avoid such damage. Therefore, when we adopt technology, we have to be guided by principles that adhere to our moral and spiritual values. So, when we eventually adopt the technology, it will not lead to a decline in the moral and spiritual values we uphold.

In order to avoid this, I urge that due consideration be given to four principles as guidance. One is the principle of Halak, the creation. We need to promote the awareness that all resources for our use belong to our Creator. Second, we have to be mindful of the fact that human beings are khalifahs and we have to establish our roles as ‘trustees’ in this world. We are the



Alexander Graham Bell's invention of the “electrical speech machine” in 1876, which brought ground breaking change in the way people communicate, where physical distance was no longer a barrier for direct communication between people is an example of disruptive technology.”





We should be grateful for the resources provided by God—fresh air, clean water, flowing rivers and so on that were created to benefit us. We should be thankful for the sustenance provided and be cautious whenever we use technology as sometimes it might be harmful.

managers of all the resources around us. Therefore, we need to behave in a way trustees do. The third principle is Mizan, or balance. Allah has created everything in balance. So to give you an example, if you have a technology, but it will be harmful to nature, leading to the pollution of rivers, causing vast deforestation, disturbing the ecosystem engine, this would only create an imbalance in the environment. As a consequence, this will upset the whole balance of the ecosystem. Yes, some might be unintended consequences of the technology adoption, but some might be intentional. The fourth one is that we must always be grateful. The reason being, being grateful teaches us to let go of our greed. We should be grateful for the resources provided by God—fresh air, clean water, flowing rivers and so on that were created to benefit us. We should be thankful for the sustenance provided and be cautious whenever we use technology as sometimes it might be harmful. If you adhere to these four principles, we can avoid and manage these somewhat costly unintended consequences.



We have to protect the essence of our religion and the good life it promotes—even when we are persuaded by technology.”

### UNINTENDED CONSEQUENCES: ARE WE READY?

Futurist, Roger Buckminster Fuller once wrote, “What better way to predict the future other than to create it”. Thinking about the future is central to the invention and adoption of technology. Surely we don’t want to have technology that would cause disasters or damaging effect on mankind and our natural resources. In Islam, we have principles aptly suited for future studies. Any new technology provides an opportunity to adapt, and Islam has a wide range of perspectives to pull from and the means to choose the best ones and act upon them. These principles are what we call maqasid syaria. In short, ‘maqasid syaria’ outlines five objectives. Ultimately, the goal of ‘maqasid syaria’ is the preservation of goodness and wellbeing. One is the protection of religion, Ad-deen. You cannot adopt a technology that would lead to disbelief or erode the noble principles of our religion. We have to protect the essence of our religion and the good life it promotes—even when we are persuaded by technology, given all kinds of logic and reasoning but are against our belief. The second principle is the protection of life. And that’s equally important when you adopt technology. You do not want to adopt a technological invention that is harmful to life, directly or indirectly. We have learned that some industrial technologies cause pollution to the air

and rivers from which the water and air we breathe and consume. This could only harm our body system. We do not want that kind of technology. Protection of life is a priority. Then the protection of our mind—‘Aql; or the intellect. In this Fourth Industrial Revolution (4IR) era, technologies such as artificial intelligence (AI), data science, machine learning, automated algorithms are some of the latest developments in brain sciences. All these can be great tools to assist us, but, if not managed properly, could eventually compete with us in an unhealthy way and challenge human intelligence. But do we really need a technology that will supplant the mind? For profit pursuit should not neglect the most important part of the economy—people. And the fourth principle is the protection of our progeny and inheritance. For instance, new methods of fact finding, such as DNA analysis can resolve confusion over paternity or assist a family in the identification of unrecognisable burnt casualties. This is an example of a noble invention. For this, you have to carefully adopt the technology. Medical and scientific technologies could put our progeny at risk. Last but not least is what we call the protection of property which can be defined in many ways including natural resources and moveable and immoveable properties—belongings, wealth and others. These five principles in a way guide us for futures thinking. And I think if innovative technology and the adaptation of technology can take into consideration these five principles, the future will look much brighter.

## MALAYSIA IN 10 YEARS' TIME

It is difficult to predict how things will play out in 10 years' time. To me, if technology goes unchecked, for example, social media is not monitored properly, especially its use by our younger generation, what would be the state of mind of our youth in 10 years' time? With the unfettered spread of fake news and *fitnah*, is it really worthwhile to adopt an advanced technology at the expense of our moral integrity? So your guess is as good as mine on what will happen in the next 10 years.

## LEARNING FROM THE PAST

I've followed and witnessed various cycles of technology growth. In my view, the beneficial results are aplenty but so are the spill overs. A simple example, a factory plant that is not fit to manage its industrial processes produces polluting waste. Toxic substances are discharged to the environment, through chimneys into the air or through pipes to the surface water. The impact is detrimental to natural commodities such as air and rivers. Worse yet, there might be an underground seepage of chemicals that flows onto the ground and groundwater. In Malaysia alone, the number of factories has proliferated since independence. As factories' capacities increase, so do their effusion.

Another example is workforce displacement, unemployment caused by automation, AI, and robotics in various sectors. Some might say that workers who move out of manufacturing, tend to get new jobs in sectors that are not vulnerable to automation such as arts, creative and services. However, these are jobs that require passion, creativity and social intelligence. The people whose jobs are in jeopardy, might not have the skills to take up interest in other areas. Despite this, we need to strike a healthy balance between the use of technology and the vitality of our human resource.



Islam has always been supportive of scientific research that brings mutual benefits to mankind. But knowledge of science and technology that is largely harmful is highly discouraged.

## SCIENCE, TECHNOLOGY AND ISLAM...

Islam has always been supportive of scientific research that brings mutual benefits to mankind. But knowledge of science and technology that is largely harmful is highly discouraged. Thus, the Islamic view of technology and science is slanted towards the purposes they promote. Rather than a blanket doctrine, this approach is essential in maintaining integrity in a changing environment.

Given the clear and growing economic case of technology advancement, if science and technology can be used to formulate better means of attaining beneficial gains without any violation of Islamic principles that seek to preserve common good, there is no question about technology acceptance. However, as the pace of business accelerates and new models are exhausted more quickly, we need to measure and manage the vitality of our people, nature and industries to grow sustainably. And as the technology environment grows more complex and dynamic, a uniform approach isn't sufficient. Instead, we need to apply a diverse set of approaches. This constant adaptation will promote prosperity. There is no reluctance as far as accepting a new technology is concerned. However, it may seem naïve to focus on adopting a new technology to improve processes and outcomes without weighing the consequences given the adverse conditions the society and environment face today.

## ● INSIGHTS

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Unintended consequences can be anticipated and allowed to happen because the benefits are considered to outweigh the disadvantages.

On the other hand, unanticipated consequences are only ever unintended.

Proven and robust foresight tools can reduce the risks of unanticipated consequences.



**LIZ ALEXANDER, PhD**  
Futurist, Author, Consultant,  
Speaker

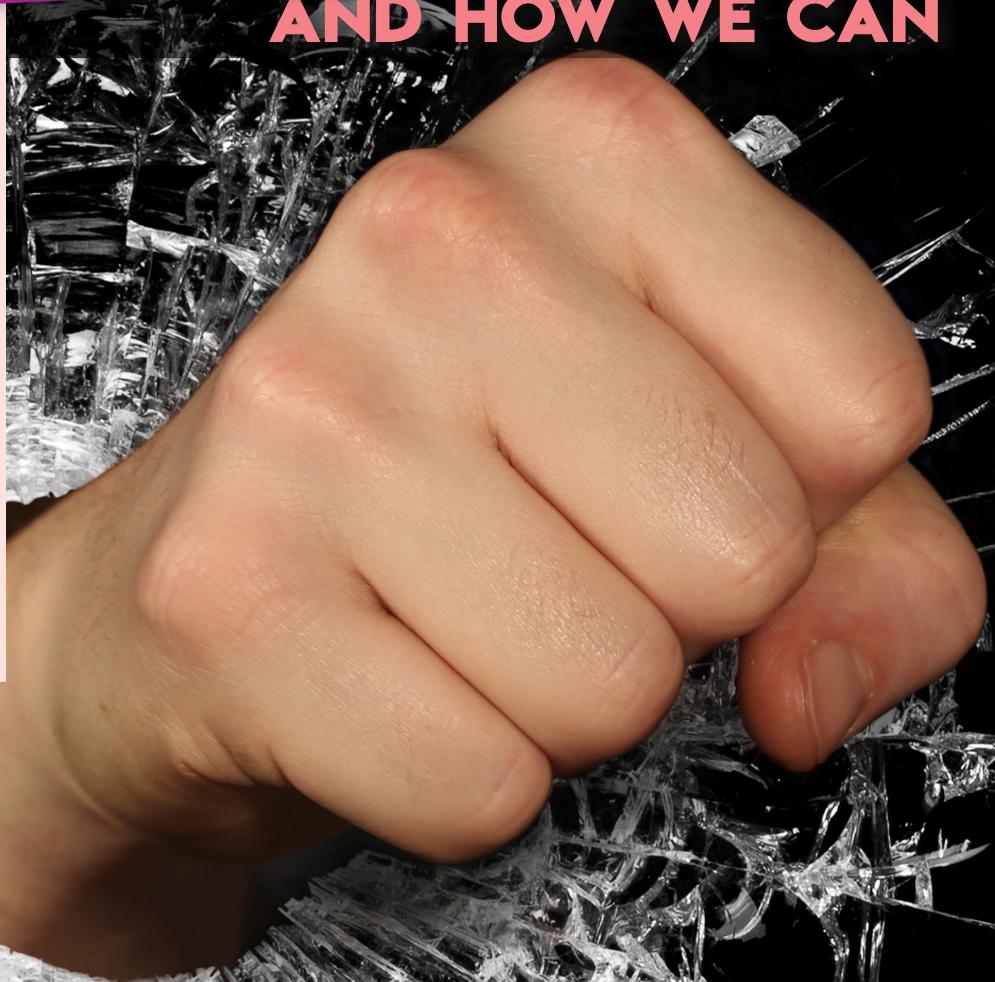
Consulting futurist, Dr. Liz Alexander, is co-founder of Leading Thought, whose clients in the United States, UK, Australia, South Africa and India look to them for ways to 'futureproof' their talent and organisations. She combines her futurist skills with a deep understanding of the strategic needs of business, especially as they relate to communicating thought leadership insights and paradigm pioneering ideas.

Dr. Liz is the author/co-author of 21 nonfiction books published worldwide, that have reached close to a million global readers. She contributes to Fast Company's online platform and writes a blog entitled 'Preparing for the Unpredictable' for Psychology Today.

# WHY WE DON'T ALWAYS ANTICIPATE

# “REVENGE EFFECTS”

# AND HOW WE CAN



**W**e have long understood the importance of anticipating the effects of our actions because, without foresight, human beings would not have survived. However, as the 18<sup>th</sup> century French economist Frederic Bastiat pointed out, in his essay entitled What Is Seen and What Is Not Seen:



...an act, a habit, an institution, a law produces not only one effect, but a series of effects. Of these effects, the first alone is immediate; it appears simultaneously with its cause.

**It is seen. The other effects emerge only subsequently; they are not seen; We are fortunate if we foresee them."**

It is indeed a fortunate person who is aware of, and overcomes, the flaw in our foresight abilities that Bastiat points out. Throughout my years as a futurist, I've noticed that even when people are advised to think about the consequences (plural!) of their decisions, innovations, or policies, they prefer to fixate on immediate outcomes rather than the knock-on effects that may be far less desirable and harder to spot. We like to think that for every cause there is a single, ideally desirable effect. Yet, in these volatile, uncertain, complex, and ambiguous times, such bias makes less and less sense—if it ever did.

Some years ago I developed and instructed a strategic communications program aimed at organisations ranging from Google to local government departments, on behalf of the University of Texas at Austin's Professional Development Center, in the United States. One of the courses covered crisis communications, which was always my favourite to teach. Largely because there were so many fresh examples I could draw on, from business and industry. These involved costly, embarrassing and—worse still—trust-shattering or injurious case studies, where executives were left asking: "Who could have imagined this happening?" when they should have been questioning beforehand: "What do we imagine could go wrong with this?"

### WHY 'UNANTICIPATED?'

I'm using the term "unanticipated consequences," raised by American sociologist, Robert K. Merton in his 1936 seminal paper, *The Unanticipated Consequences of Purposive Social Action*, rather than the more common and recent "unintended consequences." Here's why:

TABLE 1. ANTICIPATED AND UNANTICIPATED CONSEQUENCES

	INTENDED	UNINTENDED
ANTICIPATED	<p><b>A:</b> The ideal : your actions and intentions are aligned.</p> <p>Be aware, however, how often the effects of scientific discoveries were not the originally intended ones.</p> <p>(Google "accidental scientific discoveries").</p>	<p><b>B:</b> Something can be both unintended (you didn't mean for it to happen), but expected or foreseen that it would.</p> <p>For example, laws that enhance safety, but increase costs; tariffs that benefit one industry, but harm another; or the trade off between pharmaceutical drugs' side effects and the disease or pain they successfully address.</p>
UNANTICIPATED	<p><b>C:</b> (Blank)</p> <p>(Because what is intended cannot also be unanticipated)</p>	<p><b>D:</b> The biggest blind-spot, comprising</p> <ol style="list-style-type: none"> <li>i. Mixed results: unseen drawbacks in addition to expected outcome.</li> <li>ii. Backfires/"revenge effects," where the intended solution creates a new problem, or makes the existing problem worse.</li> </ol>

As you can see from Table 1, unintended consequences can be anticipated (B) and allowed to happen because the benefits are considered to outweigh the disadvantages. These causes also include what Merton called the “imperious immediacy of interest,” otherwise known as focusing on short-term interests rather than long-term ones.

On the other hand, unanticipated consequences are only ever unintended (D). It is the “unseen” occurrences of D(ii) that this article will address.

As you review the following examples, consider whether you would have agreed with the official policy prescribed. What unanticipated consequences might you have foreseen?

## THE COBRA EFFECT

In 19<sup>th</sup> century India, British colonial administrators were concerned with the problem of cobras. Too many of these highly venomous snakes were slithering around the streets of Delhi. Someone came up with what they must have thought was a sensible solution to cut back on their numbers: a bounty so generous that cobra hunting soon became “a thing.”

As Bastiat pointed out in that earlier quote, the first-order effect was immediate, and in line with what officials wanted to achieve. The



cobra population plummeted. Problem solved? Not so fast. Because the men in charge failed to consider second-order effects. To maintain their new income, bounty hunters began breeding cobras at home, before killing them and collecting the money. There were fewer cobras on the streets, certainly, but the costs associated with the policy had begun to spiral out of control. So the administrators did another “sensible” thing—they canceled the bounty. As the third-order effect kicked in, all those now worthless, home-raised cobras were released—you guessed it, into the streets.

In 1958, Mao’s Four Pests hygiene campaign began with similarly well-intentioned ideals: decimate the populations of mosquitoes, rodents, flies, and sparrows, responsible for transmitting disease. People were especially incentivised to destroy sparrows’ nests, smash eggs, kill their chicks, and shoot the birds out of the sky, because they were also blamed for eating grains and fruits. Would you have expected this action to result in a famine? The Chinese certainly didn’t.

What was not taken into consideration was that the sparrows also ate insects, including locusts. As the sparrow population decreased, locusts proliferated. The second-order effect was that rice yields plunged as a consequence. The third-order effect became known as the Great Chinese Famine, in which up to 45 million people died of starvation. A cause that, on the face of it, would seem to have nothing whatsoever to do with sparrows.

Have we learned our lesson regarding the perverse, “revenge effects” all too frequently encountered when experimenting with nature? Sadly, not. A recent gene-hacking experiment conducted in Brazil, in which a biotechnology company’s intention to: “...gene-hack mosquitoes so their offspring immediately die, mix them with disease-spreading bugs in the wild, and watch the population drop off,”



unfortunately, “didn’t quite pan out.” The first-order effect was, as Bastiat proclaimed, immediate. The genetically modified (GM) males released into the wild did cause the mosquito population to originally decrease. But, within 18 months it was back to previous levels, comprising not only of wild mosquitoes but also their hybrid offspring.

The second-order, and the as-yet only speculated third-order effects, are currently a matter of dispute. Some scientists suggest “this genetic mixing could have made the mosquito population more robust—more resistant to insecticides, for example, or more likely to transmit disease,” while the bio-tech company producing the GM mosquitoes claim that it won’t.

What is not in doubt, according to population geneticist Jeffrey Powell of Yale University, quoted in Science Magazine<sup>2</sup> is that, “something unanticipated happened.” Adding, “When people develop transgenic lines or anything to release, almost all of their information comes from laboratory studies. Things don’t always work out the way you expected.”

But why is that the case, so often, when there is ample historical precedence to guide current and future decisions? When European settlers brought wild rabbits to Australia and New Zealand in the late 19<sup>th</sup> century, to provide food, sport, and “a touch

of home,” those countries ended up with a population explosion of these pests that devastated the local ecology. When the invasive plant called kudzu was introduced into the United States around the same period, it ended up with the nickname “the vine that ate the South.” The U.S. continues to have to deal with the economic, cultural and environmental effects, costing hundreds of millions of dollars every year, because of kudzu infestation. We know from past experiences the deleterious effects of such “unforeseen” decisions—but pursue our own then act surprised when something “unexpected” occurs.

As Robert K. Merton outlined in his above-mentioned paper, ignorance is a key cause of unanticipated consequences. Not because the people involved aren’t intelligent, but because of having, “insufficient or inexact knowledge of the many details and facts needed for a highly approximate prediction of consequences.” A look back in history might help.

## DISREGARDING HUMAN NATURE

It’s not just the complexities of natural ecosystems that are responsible for so many unanticipated consequences, but something you’d think we’d all have a greater understanding of by now: basic human nature.

Perhaps you, too, have had to endure open-plan work spaces. Maybe you’ve even championed them? Indeed, the expected benefits were never in dispute: greater collaboration, leading to increased productivity and enhanced creativity, being among them. Yet many studies have found that the majority of employees heartily dislike the trend for “open architecture,” which has been proven not to work—literally<sup>3</sup>.

We may be social creatures but we’re not like bees or ants—we like our own space and to choose who we have to interact with. Paradoxically, open offices



Whenever we try to take advantage of some new technology, we may discover that it induces behaviour which appears to cancel out the very reason for using it.”

**Edward Tenner**

*Why Things Bite Back: Technology and the Revenge of Unintended Consequences, 1997*

were found to decrease the amount of face-to-face interactions by some 70 percent, prompting virtual contact like emailing and instant messaging to go up<sup>4</sup>. Employees will often wear headphones to tune out all the noise and distractions that lead to overstimulation in large open-plan areas; they report greater employee dissatisfaction because of the lack of privacy and the feeling they are constantly on show. In extreme cases they will even leave their jobs.

As Edward Tenner-- the man who coined the term “revenge effects”—wrote in his 1997 book, *Why Things Bite Back: Technology and the Revenge of Unintended Consequences*, “Whenever we try to take advantage of some new technology, we may discover that it induces behaviour which appears to cancel out the very reason for using it.”

Another of Merton’s factors is what he calls “error,” including the belief that old habits will still apply to new situations and nothing will change. Yet the more sensitive car alarms have become,

the more people tend to ignore them; Smartphone use has led to an uptick in automobile deaths and injuries, because people are texting or talking while driving—something they never used to do; self-driving cars kill pedestrians<sup>5</sup> because their software was not designed (by humans, presumably) to know that people tend to wander across roads wherever they feel like it—and not just where they should.

## YOU WON’T GET WHAT YOU IGNORE

For our final example, let’s take a look at a piece of federal legislation.

The No Child Left Behind Act (NCLB) that went into effect in the United States in 2002 was certainly well-intentioned. Who would argue against improving students’ basic competencies in reading and mathematics, after all? Rankings in which the U.S. had fallen way behind countries in Asia and Europe. How could this education reform have harmed the very students it was designed to help?

Another “error” Merton identified in his 1936 paper was “wish fulfillment,” in which “only one or some of the pertinent aspects of the situation which will influence the outcome of the action, are attended to.” One factor that appears to have been ignored with this particular legislation, something well known to parents and employers, is that you get what you reward. For example, I’ve seen this countless times within organisations that say they are committed to team-building and collaboration, yet whose incentives are directed towards rewarding individual work.

In the case of the NCLB, one of its key “innovations” was to link standardised testing to punishments, including decreased funding for schools and even closures. So—no surprise, surely?—teachers went ahead and taught only what was needed for their students to pass the exams. Yet, according to



the National Education Policy Center at the University of Colorado, Boulder, cited in a March 2015 Business Insider article<sup>6</sup>, “... there is no evidence that any test score increases represent the broader learning increases that were the true goals of the policy. Goals such as critical thinking; the creation of lifelong learners; and more students graduating high school ready for college, career, and civic participation.”

So, while the goal was to level the playing field for struggling students in comparison to their more advantaged peers, the NCLB largely did not achieve that. Before I share what I think are some simple, immediately implementable tools that might have helped change that negative outcome, I would say generally it's better to clearly state what you do want to happen (Every Student Succeeds—the reform that replaced the NCLB in 2015), than what you don't (No Child Left Behind).

## A SIMPLE QUESTION

There is a host of proven, robust foresight tools that groups can use to reduce the risk of unanticipated consequences. Scenarios and STEEP-V are just two that spring to mind. But something even quicker and simpler, I believe, could help significantly reduce the number of unforeseen effects that happen in technology, business, social action, and government.

In a Fast Company article I wrote entitled Three Ways to Unlearn Old Habits Faster<sup>7</sup>, on the topic of lifelong learning, I quoted Richard Feynman, joint winner of the Nobel Prize in Physics in 1965. He described how he navigated the doubt and uncertainty of scientific exploration this way: “We are trying to prove ourselves wrong as quickly as possible, because only in that way can we find progress.” I suggest that anyone wishing to improve their ability to foresee the second, third, and even fourth-order effects of their actions, that otherwise would remain “not seen,” might ask themselves, “How could we be wrong?” in assuming that later, less desirable knock-on effects, won't occur. Then actively seek out evidence that challenges the “immediate effects only” assumption.

The default for most people, however, is to do the opposite: known as confirmation bias. Sadly, we are too inclined to want to prove ourselves right. Which is why, 200 years after Bastiat wrote his treatise on foresight, it appears only a limited number of “fortunate” individuals still do the hard work of thinking, in order to foresee what others can't.



Which is why, 200 years after Bastiat wrote his treatise on foresight, it appears only a limited number of “fortunate” individuals still do the hard work of thinking, in order to foresee what others can't.”

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## ● INSIGHTS

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Three dead economists show us a way to think about changing macro conditions beneath the surface and emerging strategic issues.

Because of their near monopoly status, tech platforms deliver the growth and productivity and frankly most of the excitement in the world today.

But the world might want to pay heed to growing techlash.

# TALKING WITH THREE DEAD ECONOMISTS



**Robert Malthus**



**Joseph Schumpeter**



**David Ricardo**

Images: John Linnel, Wellcome Collection Thomas Phillips, National Portrait Gallery Institute for New Economic Thinking



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Chor Pharn Lee is a Principal Strategist at the Centre for Strategic Futures. In this role, Chor focuses on developing the centre's strategy and delivering results aligned to the centre's national objectives.

Chor has been with the centre, a think tank that pursues long-term futures research and builds foresight capabilities across the public service since 2016.

Chor spent nearly 25 years as a strategist and an engineer for a number of Singapore's trade agencies. Prior to his current role, Chor served as the Deputy Director at Singapore's Ministry of Trade and Industry. Before joining the ministry, Chor was the deputy director at Infocomm Development Authority specialising in communication and marketing.

Currently based in Singapore, Chor holds a master's degree in Electrical and Electronics Engineering from the Cornell University, America and an MBA from the Nanyang Business School, Singapore.

I gave the keynote a few weeks back at the Asia Pacific Futures Network, held in Bangkok. The theme was ASEAN 2030, and I wanted to get the audience to think about decades differently, first starting with the past and then looking into the future. Like warmup exercises.

Below are my raw scribbles, lightly edited.

If you stood at the dawn of 1980, your prominent belief of the WAY the world is would be informed by the oil crisis, that you should own real assets, especially energy assets, and American businesses are number one. But if you were contrarian and owned zero energy and held on to those assets, you

would have been rewarded handsomely because the top companies of 1990 were Japanese.

Standing at the dawn of 1990 looking out a decade, you may have believed that you should start learning Japanese and move to Tokyo, Japanese management techniques like Kaizen would ensure that Japan would take over the world. But if you were contrarian and underweighted Japan, you would have done handsomely because the top companies of 2000 were not Japanese but a mixture of “old economy” versus “new economy” stocks in media, telecoms and technology. But if you ignored the “sticky eyeballs” hype, it would have paid off for you come 2010. Standing at the dawn of 2010, you would breathlessly see China as the rising giant, with an insatiable thirst for commodities driving a super-cycle of peak oil, peak copper etc. The top companies were involved in digging things out of the ground. And if you said no... well, you see the pattern right? Because by 2019, the top companies are technology platforms and not commodities extractors.

So, today on 17 Sept 2019 with only a few months to go till 2020, what would you be thinking?

## UNDERSTAND THE PRESENT

This little exercise is humility inducing. It is not easy to sense the future. The tendency is to project the recent past into the future and not pay attention to the subtle, hidden macro conditions that are evolving just beneath the surface. We need to do better to know the present. This means reading emerging strategic issues in near real-time, and looking out for phase changes. During a phase change, certain properties of the medium change, often discontinuously, as a result of an external condition. Think of water as a solid, liquid and gas.



The tendency is to project the recent past into the future and not pay attention to the subtle, hidden macro conditions that are evolving just beneath the surface.

I will talk a bit more about this at the “how to” section towards the end.

Let’s go back to standing at the edge of 2020 today, and the answer you might be thinking of is “tech platforms”. Because of their near monopoly status, tech platforms deliver the growth and productivity and frankly most of the excitement in the world today.

Going by geographic focus, you might also think of “America” as a disproportionate number of them are American. And all this is sensible. But you might pause, hold back and think of your experience since 1980 and ask how might I approach this differently?

## THREE DEAD ECONOMISTS

Here’s where three dead economists might show us a way to think about the changing macro conditions beneath the surface, and emerging strategic issues that point to a phase change.

Ricardian expansions, named after David Ricardo and the theory of comparative advantage in international trade. This is usually expansion into new territories like China.

Schumpeterian expansions, named after Joseph Schumpeter who popularised the term “creative destruction”. This is typically driven by new technologies - railways, smartphones, the internet, AI - that typically lead to progress for humanity.

Malthusian contractions, named after Robert Malthus who worried about food shortages with a rising population.

The consensus out there is Schumpeterian. It is a brave new world dominated by more “software eating the world” - into finance, into healthcare, into energy, as robots and machine learning eliminate mindless work and we shift away from fossil fuel dependence. But we might want to pay heed to growing techlash.

Techlash from the many scandals that firms have misused and mishandled personal data, firms that misuse their monopolistic positions to “eat the ecosystem” and throttle startups. For example, Amazon has such high monopoly power that when the French government imposed a 3% digital tax on Amazon in 2019, they passed on the entire tax to small and medium French businesses using the platform!

European and American regulators are already considering a clamp down on these tech giants and break up their market power.

Decade long big trends might be like very big dogs - they seldom live past their first decade. The historical precedents would suggest that the next decade long trend may be Malthusian - not enough for everybody - or Ricardian - new territories?

The obvious candidates for Ricardian expansions come under a cloud when we consider the collision of demographics, automation and climate change. For example, many face significant challenges ahead. Demographic bulges might not be demographic dividends due to poor human capital investment and inability to create jobs. And fewer are well placed to handle the coming wave of automation or climate change. Capetown was voted the best city in 2015, and this year experienced a harrowing Day Zero [defined when most of the city’s taps will be switched off – literally.] This is not an anomaly. The south Indian city of Chennai also had its Day Zero.

How about other candidates like Central Asia in China's Belt and Road Initiative? How about the 3 billion unbanked that Facebook's Libra is targeting?

How about the far North when climate change opens up new territories for trade and energy?

Day Zero and the far North segue into Malthusian contractions, where climate change will be a main driver of high temperatures, food and water stresses in many geographies.

The physical risks of climate change are well known, but transition risks are not. Transition risks are financial risks which can result from the process of adjustment towards a lower-carbon economy prompted by changes in climate policy, technology or market sentiment.

## THIS CAN SOUND VERY BLOODLESS

But I think we should pay attention especially to sentiment because if physical risks pile up, disasters will be so frequent that market solutions will be insufficient. Politicians will intervene to distribute costs where policy and market fail. After the recent EU elections, the Green Parties are now the kingmakers and Europe may be on the verge of its own Green New Deal.

So there, we have three different lenses to talk about the next decade.

This little exercise is not meant as an investment guide! I am trying to point out how we humans anchor easily to immediate events like prices, but we are lousy at reappraising fundamentals and changing our views.

Let me change pace a bit and focus on the "how-to"s.

## HOW DO YOU SEE THE FUTURE IN THE PRESENT?

Outliers. Find this 17% of the population who see the world differently before they know society condemns them as deviant. How do you find them? How do you connect with them?

In place of conventional (asset-heavy) approaches, an asset-light approach focuses on befriending "strange attractors" to pull interesting thinkers into your orbit. Strange attractors are generally not found on the circuit, but in "dark forests". Once we get inside these channels, we can access new, unconventional thinking and opportunities as it emerges.

Dark Forests is borrowed from Liu Cixin's sci-fi trilogy *The Three Body Problem*. The universe is full of predators, so forms of life that exist keep their silence. The Dark Forest theory of the Internet describes how, in response to the ads, tracking, trolling, hype and other predatory behaviours etc. interesting conversations are moving to private channels like newsletters, podcasts, slack channels.

Small roundtables. Unstructured. Clever, thoughtful, unusual individuals. A hard topic and let them bounce off ideas in a relaxed environment. We run a foresight conference every other year in this format to get ideas that one would not normally come across.



Transition risks are financial risks which can result from the process of adjustment towards a lower-carbon economy prompted by changes in climate policy, technology or market sentiment.

Don't be a computer. What are humans good for? Spotting outliers, connecting patterns and so on. Don't put them in environments that are better for AI and Machine Learning. Art, not just classical art but also the disciplines to create art, help you see novel connections.

Generations. Use trans-generational groups to help find new solutions, combining the practical wisdom of age with the inspiration and ideas of youth.

## HOW DO I DO FUTURES?

Exaptive. This is a process in which a feature acquires a function that was not acquired through natural selection. This function is repurposed for novel use. Like feathers. The earliest feathers belonged to dinosaurs not capable of flight. They must have first evolved for something else. Researchers speculate early feathers may have been used for attracting mates or keeping warm. The idea is to prepare things in advance so people will change.

Here's an example. Think about the gorilla and basketball exercise. People are so focused on the ball passing that they mentally block out a man in a gorilla suit walking past. But if you showed them a nature documentary prior, the number of people who spot the gorilla goes up. Futures is that nature documentary so we prime people to spot that man in a gorilla suit.

Bad news. People don't buy utopian novels or fancy cosy visions. That is just our biological imperative. Brains pay attention to failure, not to success. Evolutionarily speaking, avoiding failure equals success. Don't fight against biology. Dystopias help focus attention, and then present counterfactuals [relating to what has not happened or is not the case] which sets the brains in the room up to focus on doing something different today.

## ● VIEWPOINTS

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Automation, big data, and AI are remaking law practice.

Fresh legal start-ups at the frontier of new technologies as early adopters of legal tech.

DIY law changing legal clients' perceptions and how lawyers will work in the future.



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# THE FUTURE OF LAW: REFRESHING THE LEGAL SYSTEM THROUGH ADVANCES OF TECHNOLOGY



Today, most industries are changing the way they operate. Considering how far the technology landscape has evolved, this is a given. However, the trend belies the economic reality hitting most industries. While some changes are welcomed, others have been imposed, on the basis of adapting to a fast-changing surrounding. To survive, industries need to operate fluidly and blend with constantly changing standards and requirements. Industry analysts point to a few reasons for this, but especially a lack of innovation in some industries leaves them highly vulnerable to disruption. Having said that, the legal industry is no exception. It is now subjected to being disrupted by the technological revolution. Technologies such as automation, big data, and AI are remaking how its practitioners go about their practice. Such is the impact that legal professionals are left with no choice but to adapt, sooner or later. Being connected is the hype that's accelerating the digital world, bridging gaps between law and other industries that are a few steps ahead. But who can complain when technology is making legal processes faster and more efficient by reducing operating costs and making legal services more accessible.

### MOVING AWAY FROM TRADITIONAL PERSPECTIVES

The traditional model, which has served law firms well for decades, is now in a conundrum. Following the arrival of new technologies, legal clients are demanding more. The practice's business model has had to change too. It needs to carry over some of today's more familiar trends promoted by technology: consumer-centric, transparent, affordable, predictable and easily accessible as legal clients are getting smarter.

Today, fresh legal start-ups are active at the frontier of new technologies. To make it more interesting, they

are attracting the most talented young lawyers simply because they can offer something that most large firms can't—flexibility. This is a trend that's gathering pace throughout the industry. Meanwhile, young and talented freshly minted law graduates are more interested in pursuing entrepreneurial paths and job opportunities in the legal start-up community for the perks that these revitalised start-ups can offer.

However, what is even more interesting is the development taking hold in the area of legal research. Led by technology, legal research is getting smarter and more comprehensive. Now, legal research is powered by AI and natural language processing. For typical lawyers, it would normally take them weeks to complete a research. AI, on the other hand, has the ability to do the equivalent in just a few hours. Plus, AI does not get tired, sleep, eat or drink. In fact, AI can produce significantly better results than most average lawyers.

### LEGAL TECHNOLOGY - THE FUTURE OF LEGAL SERVICES

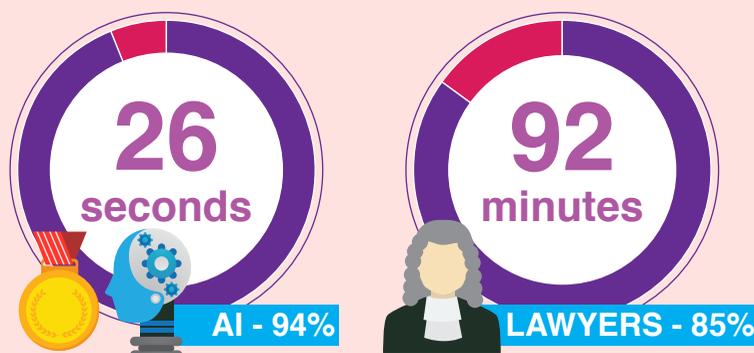
Legal technology, also known as legal tech, is an application of technology and software that helps law firms manage legal cases. From management, documentation to billing processes, the technology uses big data to provide e-discoveries and predictive analytics. In

part, this helps both, lawyers and clients access their case, therefore reducing time, money and other laborious costs.

The legal tech industry is making progress in most developed countries such as the US, UK and Australia. Lawyers in these countries are aware of the market changes and are willing to invest in technology and adopt new innovations. This has contributed to the emergence of legal tech start-ups that use AI to automate mundane and routine legal work.

Imagine just how fast it will take to review five or more non-disclosable agreements (NDAs) using special algorithms compared to the lengthy hours it normally takes by practicing lawyers. According to a US based legal tech start-up, innovation in legal services is 200 times faster with an accuracy of 94%. This can help lawyers conduct research more effectively by enabling them to extract relevant past cases from the available data pool. Compared to the manual form of retrieving documents which is time consuming and far less accurate, a study reveals that the average time required for practicing lawyers is 92 minutes, while AI does it in 26 seconds. Further, AI can continue this process for a sustained period without rest. Of course, there are things AI can't do—like meeting clients or showing up in court. However, AI's potential in delivering productivity

#### ACCURACY LEVEL : AI VS LAWYER



**AI achieved an accuracy level of 94%, compared to an average accuracy level of 85% across 20 human lawyers.**

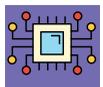
gain is something significant, especially when it comes to data-crunching tasks.

Young lawyers today are likely the ones benefiting from this. They are more tech-savvy when it comes to handling software. It is also likely for legal firms in the future to have their own law-tech experts in house or at least, firms will insist on hiring legal practitioners with some degree of tech competency.

In Malaysia, the legal tech industry is still in its infancy. The adoption rate of technology is somewhat slower, as compared to our neighbours. However, currently, there is a growing number of firms exploring tech-driven solutions to improve their day-to-day tasks.

To speed up the development, there is a need for collaboration between law firms and local universities. Universities need to ensure that they can produce future graduates with the right skills to exploit legal technologies and platforms gaining ground in the sector.

## LEGAL TECH TRENDS - THE NEW REALITY



### AI and machine learning

AI is transforming legal practice on its head. Many legal professionals are aware that AI can significantly reduce cost and time as well as bump up accuracy. Going forward, AI plays an important role in promoting faster delivery of legal services while keeping cost down.

Corporate law firms and legal departments can now use AI to review documents. Now, AI tools have the capability to guide lawyers around analysing and drawing insights from content. In the legal context, AI is defined as an intelligent technology despite possessing clearly defined functions.

Despite the remarkable usage of AI in legal industry, it also poses ethical and governance concern, especially when the AI produces something which is beyond the existing norms and standards. This is where lawyers still have the same due diligent duties, including duties of supervision and independent judgement especially on cases that involves public goods.



### Cloud computing

The legal industry has always been hesitant to move towards cloud, for one good reason—security. Legal firms keep abundant of confidential and classified information, thus the reluctance. However, realising that the days of traditional IT are well behind, technology like cloud computing is now far more capable of providing the next level of security in order to avert data breaching.

Cloud computing may not be new, but it is surely new for law firms that have only begun to take notice of the technology recently. Legal firms should be able to take advantage of what the technology can offer.

Furthermore, the rise of agile working culture has made life easier with the availability of cloud solutions. This allows everyone to work remotely as long as they have good access to internet connection. The technology will provide flexible working options for lawyers and it can be a significant factor in attracting and retaining talent.



Cloud computing may not be new, but it is surely new for law firms that have only begun to take notice of the technology recently. Legal firms should be able to take advantage of what the technology can offer.”



However, the good news is that in this digital age, we are seeing constant flow of data and information automatically recorded and uploaded to various online database called Big Data.”



### Big Data and legal research

The legal industry is a sensitive one. There have been countless high-profile incidents where data has been leaked or manipulated by outsiders. Losing client trust and the risks and liability of data breaches are detrimental if firms fail to protect the integrity of their data.

However, the good news is, in today's digital age, we are seeing a constant flow of data and information being automatically recorded and uploaded to various online database called big data. Big data makes it so much easier for legal research to track relevant precedents. Almost all of them have been archived.

To help lawyers decide on the best litigation strategies, big data offers lawyers a huge advantage. From a legal analytics point of view, lawyers can make better judgements by studying previous outcomes of relevant cases with advanced research tools. This also makes researching less time consuming for lawyers to find previous law cases and precedents by looking up relevant keywords.



### Automation

Many billing, administrative and secretarial processes have already been automated. To some degree, large and small boutique firms as well as sole practitioners are turning to outsourced services (which are generally driven by technology) to save costs.



### DIY law

How many of us, before consulting a lawyer, do some of the groundwork ourselves? It is common nowadays for people to seek legal advice from the web. By asking questions online, answers will instantaneously pop up from various sources. At least, this can help many to form a preliminary understanding on the case before heading to a legal firm to seek further clarification. Not only that, today we are seeing DIY law on legal documents and templates. For example, tenancy agreements and other documents are easily available online these days. Although legal tech is designed to help legal firms, it is also targeted towards potential clients by way of helping them to do research beforehand.

## DIPPING TOES IN THE WATER: THREATS AND OPPORTUNITIES

Countries with bustling legal tech development like the US believe that legal tech outperforms the average lawyer in terms of efficiency. However, because legal tech is on the rise, it has caused an impending threat on job security especially to traditional practice firms. Then again, such fears are also caused by the lack of legal tech experts in the industry.

Legal tech development represents an opportunity for many established firms looking for efficiency gains and a way to accommodate an increasingly popular agile working culture. Technology

provides a way for boutique firms and sole practitioners to compete with bigger players, giving them access to powerful research tools which help to level the playing field. High street firms struggling to adapt their practices are already losing out to smaller and leaner outfits as well as digital disruptors.

To be able to fit in the fast-changing world where people are mostly online 24/7, firms need to change many of their traditional working practices in order to survive and thrive. For instance, lawyers' availability to meet clients anywhere and everywhere is key. Being available to meet clients in a single office location 9-5 Monday to Friday is no longer good enough. Clients are demanding flexible approaches these days. This gives clients the option to communicate with their lawyers outside regular office hours via WhatsApp or Skype, and access case management tools where they can view progress and provide comments.

Similarly, lawyers themselves are demanding flexible working opportunities, where work is judged on results rather than office attendance. New entrants to the profession are more willing to jump ship to more forward-thinking firms, thus,

leaving traditional firms losing out on precious young talents. An unintended consequence of the growing technology has led to the emphasis on flexibility from both clients and lawyers. Lawyers, without any reasonable doubt, have to adapt to this fast changing phenomenon by looking at it positively.

Legal tech provides a huge opportunity for tech companies. By developing products for law firms or selling services direct to consumers, tech companies can obtain a bigger share of the legal market. Arguably, by providing better access to legal services for a substantial segment of the public who otherwise are priced out of the services, this makes the DIY law option more attractive than ever.

Ultimately, legal tech cannot do everything lawyers do, but it can definitely make their lives easier by saving them the hassle of strenuous administrative work, which can be done in seconds with higher accuracy. Therefore, it should not be presumed as a threat but a sidekick that complements and increases practicing lawyers' efficiency overall.

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## ● VIEWPOINTS

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The shipping industry is one of the biggest contributors to pollution and carbon emissions.

Industry players need new technological solutions to comply with recent regulatory changes, thus effecting supply and demand curves.

AI is aiding an industry-wide transformational shift with logistics and communication technologies.

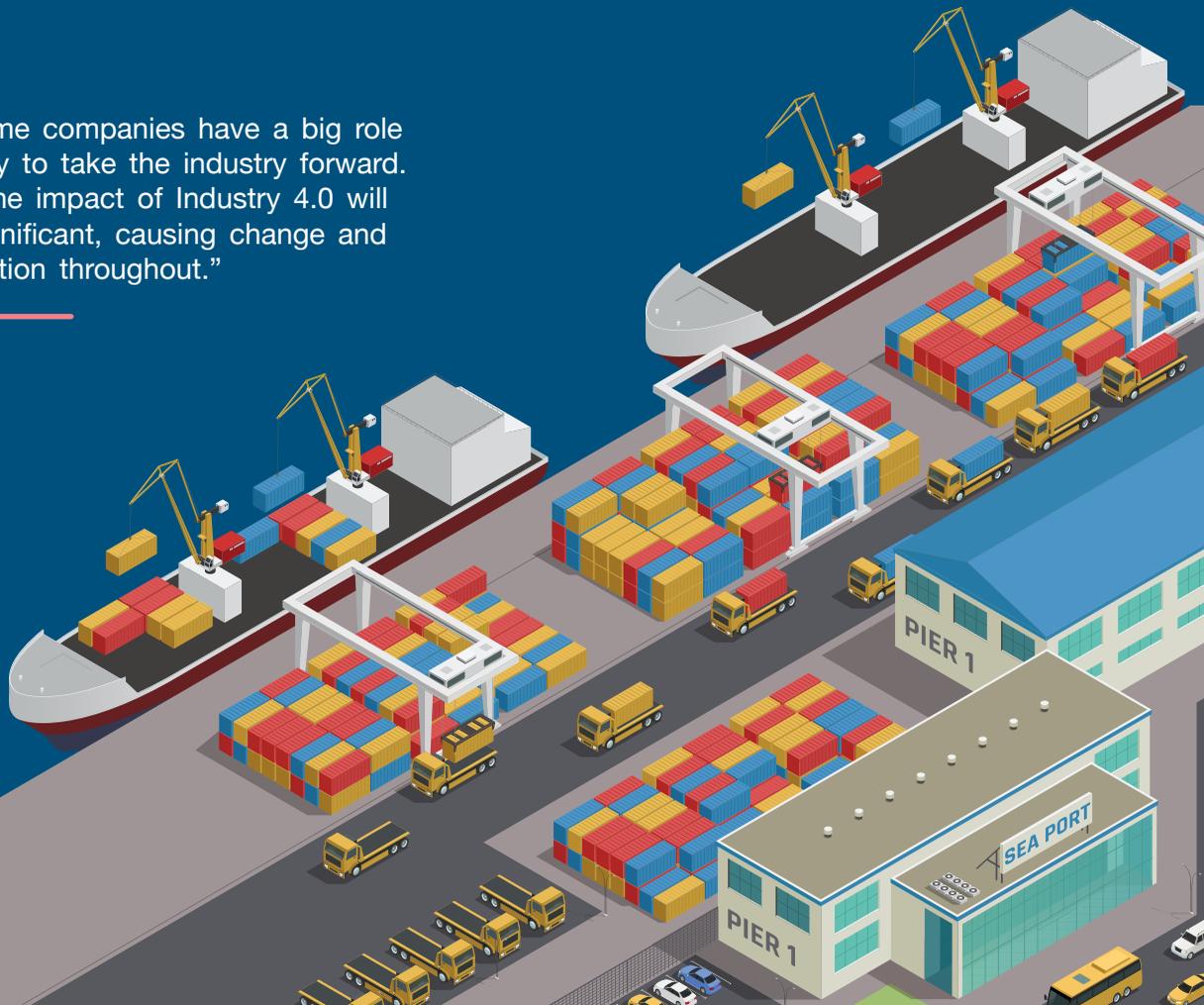
# GAME CHANGER FOR THE MARITIME INDUSTRY



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Maritime companies have a big role to play to take the industry forward. And the impact of Industry 4.0 will be significant, causing change and disruption throughout.”



Implementing Industry 4.0 is amongst the top of the priority list for most companies. At the moment however, Industry 4.0's impact can only be significantly felt in manufacturing and the future of work. Despite this, the maritime industry is slowly picking up steam. The industry, which largely consists of shipping, ship building and repair companies and port authorities has slowly begun to take steps towards scaling a digital transformation.

Production efficiency, ship safety, cost efficiency, energy conservation and environmental protection in the maritime industry will pose unprecedented challenges as well as opportunities for the maritime industry. Maritime companies have a big role to play to take the industry forward. The impact of Industry 4.0 will be significant, causing enduring changes and disruptions throughout. The implementation of Industry 4.0's brand new technologies and practices will create values never seen before in the process. And demand for new solutions will surge along with a pressing challenge to reduce production and operational costs. At the same time, production efficiency will also be increased.

Although Industry 4.0 is still in its nascency, its unintended or unforeseen consequences remain to be seen. Essentially, how do we make sure unintended consequences can be

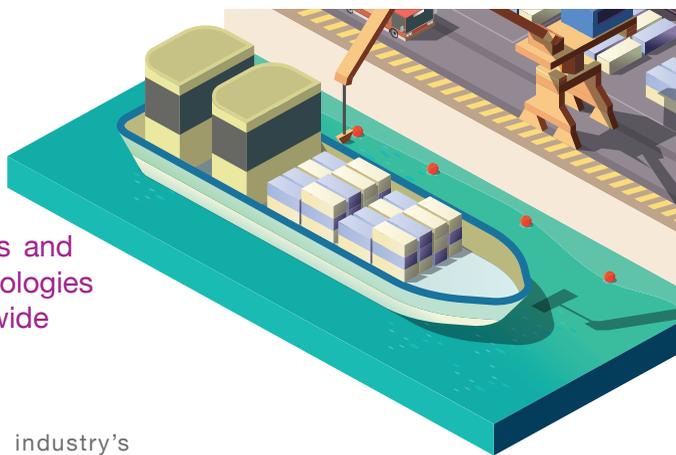


AI is aiding the shift by integrating new shipping logistics and communication technologies and evolve industry-wide business models.

minimalised across the industry's social and business aspects? In this article, we will explore in what ways, unintended consequences of Industry 4.0's practices and technologies will shake up the maritime industry.

### AI AND AUTONOMOUS SHIPS

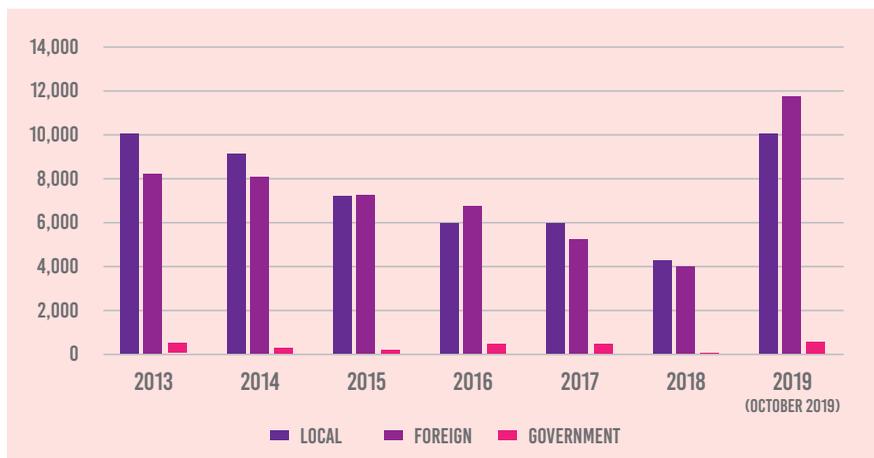
The shipping industry is undergoing a massive global transformation and artificial intelligence (AI) has become a buzzword for one of the most happening trends in the industry. To put the development into perspective, AI is aiding an industry-wide shift by integrating new shipping logistics and communication technologies, evolving long-held traditional business models. Soon, autonomous ships cruising the sea are going to be a common sight and the main benefit of the sailor-less system is in taking out human errors to enhance safety at sea.

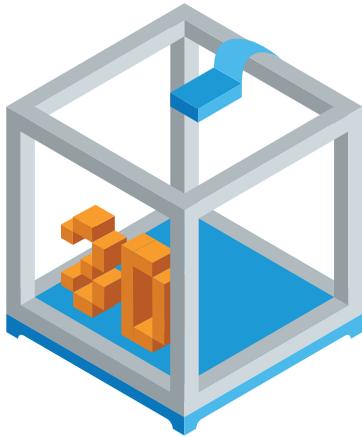


#### >> IMPACT :

- Data captured by the Marine Department of Malaysia shows a significant drop in the number of seafarer yearly registrations since 2013. But in 2019, the number increased again after tapering off a few years earlier. Why? Does this indicate that the shipping industry is bouncing back? Yet most ships will be autonomous in the near future. This raises one big question—where will these seafarers go?
- The common sentiment being shared in the industry is the perception that ports' daily operation systems are unable to cope with rapid technology advancement. Infrastructure growth is limited and a massive amount of investment is urgently needed to keep pace with the latest trends showing up. Coordination between ports and other players in the network chain is also a concern. Documentary requirements and procedures on the arrival, are still using manual systems across port operations. Moving forward, this needs to change dramatically to support smart port operations. Additionally, various skill gaps must be addressed as some traditional shipping jobs will no longer be relevant.

### REGISTRATION OF SEAFARERS (NEW APPLICATION)





### 3-D PRINTING TECHNOLOGY

Commercial ship operators may benefit from the emergence of cost-effective and reliable 3D printing. The technology will reduce inventory of spare parts stored on board and can be particularly helpful in the case of difficult-to-source components.

The parts can also be produced without the heavy scantlings previously created through the casting process with efficient lightweight options. Small basic parts such as valves, pipes or impellers could potentially be made on board in the event of a failure.

#### >> IMPACT :

- The cost and availability of 3D printing materials may turn out to be the main obstacles hindering the technology. While most shipping parts in use are made out of metal, e.g. propellers, bolts and nuts, currently, polymer, which is the most widely used 3D printing material is not strong enough for maritime use.
- Manufacturers and classification societies will inevitably need to verify the quality of parts, even if they are produced using OEM-approved programmes and machines. There is a risk that spare parts are produced negligently and their performance not up to par with conventionally made spare parts. This gives rise to concerns around the quality of spare parts made by 3D Printing. Are they similar in quality to the parts they are trying to replace? Can the parts do away with the conventional testing development method and still be reliable?

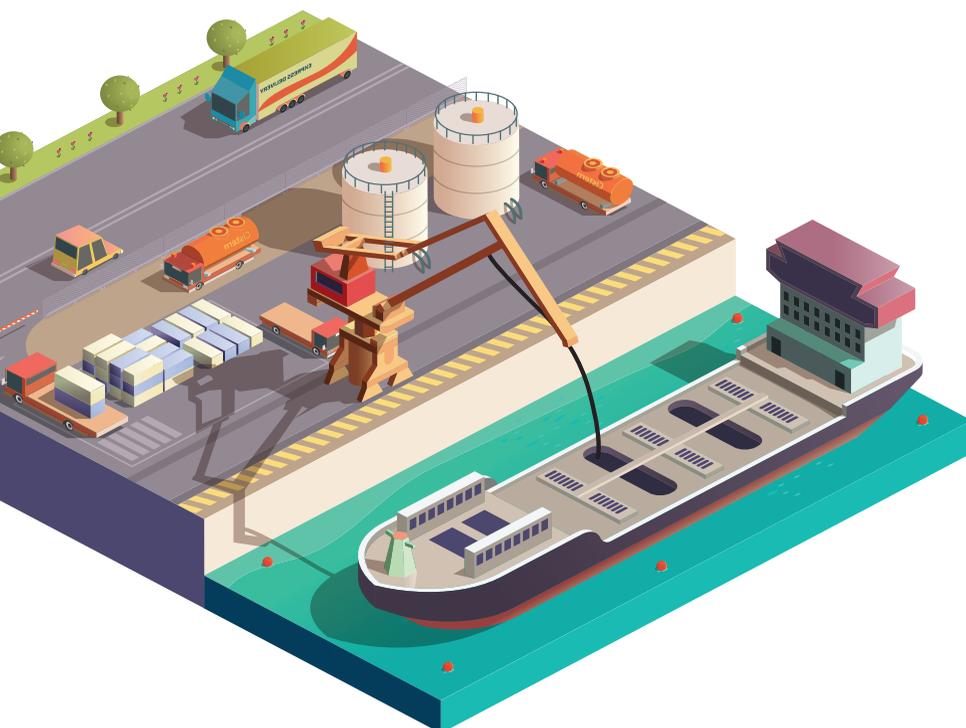
### GREEN TECHNOLOGY

The shipping industry is one of the biggest contributors to pollution and carbon emissions on the planet. The industry consumes 4.4 million barrels of oil per day, accounting for 10% of the oil consumption attributed to the entire transportation sector.

Most ships use fuel that contains 3,500x more sulphur than typical automotive diesel which is 3.50% m/m (mass by mass). The industry's combustion emissions can cause respiratory symptoms and lung diseases to occur among shipping port communities. From 1 January 2020, the limit for sulphur in fuel oil used on board ships operating outside designated emission control areas is reduced to 0.50% m/m.

#### >> IMPACT :

- Action needed to comply new emission requirements will result in higher shipping rates and increased prices of consumer goods. It is estimated that the increase in costs for port-to-port operations will hike around 10% - 20%, which will likely be paid for by consumers.
- The availability of adequate bunkering infrastructure concerns some operators exploring the viability of switching vessel combustion to LNG/LPG. For other option like installation of scrubbers & LNG tanks in existing vessels will occupy additional space on the ship on the other hand, costs up to several millions per ship.



The industry consumes 4.4 million barrels of oil per day, accounting for 10 percent of the oil consumption attributed to the entire transportation sector.

## CYBER SECURITY

Today, ships are under far bigger threats than piracy. Maritime operation systems are vulnerable to cyber-crime attacks. Although ships may not appear to be natural targets for cybercriminals, however, the wide array of potential access points on modern vessels such as internet connectivity, the use of digital control systems, satellites and radio communication systems, make ships vulnerable to cyber-crime.

In port operations, cargo handling and container tracking systems are all controlled by software that are fundamental to the industry's smooth operations. The same systems are also applied in shipyard inventory and automated processes for ship repair or new shipbuilding projects. However, now, the maritime industry faces a looming threat posed by attackers who are equally as menacing as pirates without any risks of physical confrontations.

### >> IMPACT :

Highly-skilled hackers have demonstrated the ability to penetrate maritime systems, putting vessels at risk of crippling consequences. Navigation systems such as Global Positioning System (GPS) and Vessel Automatic Identification System (AIS) can easily be hacked, leading to compromised maritime security and safety of navigation. In addition, maritime passage plans could be affected, which may result in ships' delayed arrivals, collisions and loss of data, ultimately costing shipping companies severe losses.

Without an IT recovery plan or a business continuity plan, it would be very difficult for any company to re-track its business activities to a normal state after a disaster (cyber-attack) strikes. Shipping companies may find it difficult to protect their IT systems as compared to preparing for pirate attacks. In addition, it is obvious that current maritime regulations and policies only take into account the physical aspects of security and safety. Decidedly, policy makers need to speed up taking action on cyber and information security to safeguard the industry.

## CONCLUSION

Inevitably, the maritime industry's future lies in autonomous technology. However, people will remain an essential component of the industry's long-term future. Despite all the challenges, there is a need for the industry's talents to upskill in light of the critical skills needed to propel the industry forward. New jobs, such as ship automation specialists, cyber security specialists, 3D printing technicians, energy efficiency optimisation specialists and data protection specialists will demand a massive talent pool to support growth. Engineers, software developers and mechanics who are able to work

with new technologies too will be in high demand.

Malaysia is a strategic maritime hub in Southeast Asia. Two of the region's main maritime corridors—the South China Sea and the Straits of *Melaka* pass through Malaysia's territorial waters and exclusive economic zones. More than 80,000 vessels ply their trades across the Straits of *Melaka*'s water every year. In addition, more and more oil and gas exploration activities are taking place by the year in the South China Sea.

With the government lending stronger support to the industry with the launch of the Malaysian Shipping Master Plan, the country is geared to become a self-sufficient and internationally competitive nation. This will benefit players in the maritime industry's supply chain sector. Given the emergence and higher adoption of Industry 4.0 technologies, there are still plenty of opportunities for the sector to grow.



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## ● VIEWPOINTS

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To exert more influence on change, policymakers are increasingly turning to behavioural sciences.

One key component of choice architecture is simplicity.

Choice architects influence decision making by simplifying the presentation of options.



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## BEHAVIOURAL INSIGHTS, FORESIGHT AND UNINTENDED CONSEQUENCES

**F**oresight tools as policy enabler provide access to understanding trends and issues, firming destination (visioning) and anticipating the future. The world we are living now involve element of volatility, uncertainty, complexity and ambiguity known as VUCA world. Solving wicked problem is a tricky and sometimes resulted in unintended consequences. Tools like behavioural insights could be leveraged as part of foresight tools in enabling decision making for government and businesses.

Governments can only solve complicated challenges like obesity or climate change with the help of changes in public behaviour. Classic policy tools like publicly-provided services, taxes or subsidies can play a part. But on their own they're rarely enough. For example, cutting carbon emissions may involve encouraging people to use their cars less, or pay closer attention to household energy use.



One widely used definition of behavioural change at individual level is given by Bandura (1977): **“A behavioural change can be a temporary or permanent effect that is considered a change in an individual’s behaviour when compared to previous behaviour.”** This change is generally characterised by changes in thinking, interpretations, emotions, or relationships. These changes can be either good or bad, depending on which behaviour is being affected.”

Policymakers are increasingly turning to the behavioral sciences to tackle intractable policy challenges, including increasing student learning, raising savings rates, promoting energy and resource conservation, increasing productivity, improving sanitation practices, strengthening institutions, and reducing corruption.

### WHAT IS BEHAVIOURAL INSIGHT?

When individuals are thinking automatically, a mere “nudge” may change their behavior. A nudge is a policy that achieves behavior change without actually changing the set of choices. It does not forbid, penalise, or reward any particular choices. Instead, it points people toward a particular choice by changing the default option, the description, the anchor, or the reference point. To encourage people to choose a more healthy diet, for example, according to Thaler and Sunstein, “Putting the fruit at eye level counts as a nudge. Banning junk food does not” (2008, 6). Putting the fruit at eye level is a change in framing.

Policy maker who use behavioural insights known as ‘choice architect’. A choice architect is someone who organises the context in which people make decisions. Many people are choice architects, most without realising it. Think of doctors describing the available treatments to patients, matchmakers describing marriage

choices, or moneylenders describing loan products. Choice architecture influences decision making by simplifying the presentation of options, by automatically evoking particular associations, or by making one option more salient or easier to choose than the alternatives (Thaler and Sunstein 2008).

A component of choice architecture is simplicity. Too many options or too much complexity may lead individuals to avoid thinking through a decision, to postpone indefinitely making an active decision, or to make error-ridden decisions. Consider an example in voting in which individuals may have to make choices in scenarios for which they have limited experience and little or no education or training to prepare them.

Policies that create reminders or remove small impediments in such areas as savings, adherence to health regimens, and voting in elections have had successes in narrowing intention-action divides.

### Common framework : EAST Framework

	Make any intervention...	What that means	Example
E	<b>Easy</b> 	<ul style="list-style-type: none"> <li>• Harness the power of defaults.</li> <li>• Reduce ‘hassle factor’.</li> <li>• Simplify messages.</li> </ul>	Auto-enrollment in pension schemes: in the first six months after employees in large firms were automatically enrolled into pension schemes, participation rates rose from 61% to 83%.
A	<b>Attractive</b> 	<ul style="list-style-type: none"> <li>• Attract attention.</li> <li>• Design rewards and sanctions for maximum effect.</li> </ul>	Drawing the attention of those who fail to pay roadtax: when letters to non-payers of car tax included a picture of the offending vehicle, payment rates rose from 40% to 49%.
S	<b>Social</b> 	<ul style="list-style-type: none"> <li>• Show that most people perform the desired behaviour.</li> <li>• Use the power of networks.</li> <li>• Encourage people to make a commitment to others.</li> </ul>	Using social norms to increase tax payments: when letters from HMRC stated that most people pay their tax on time, it significantly increased payment rates. The most successful message led to a 5% increase in payments.
T	<b>Timely</b> 	<ul style="list-style-type: none"> <li>• Prompt people when they are likely to be most receptive.</li> <li>• Consider the immediate costs and benefits.</li> <li>• Help people plan their response to events.</li> </ul>	Increasing payment rates through text messages: prompting those owing Courts Service fines with a text message 10 days before the bailiffs are to be sent to a person’s home doubles the value of payments made, without the need for further intervention.

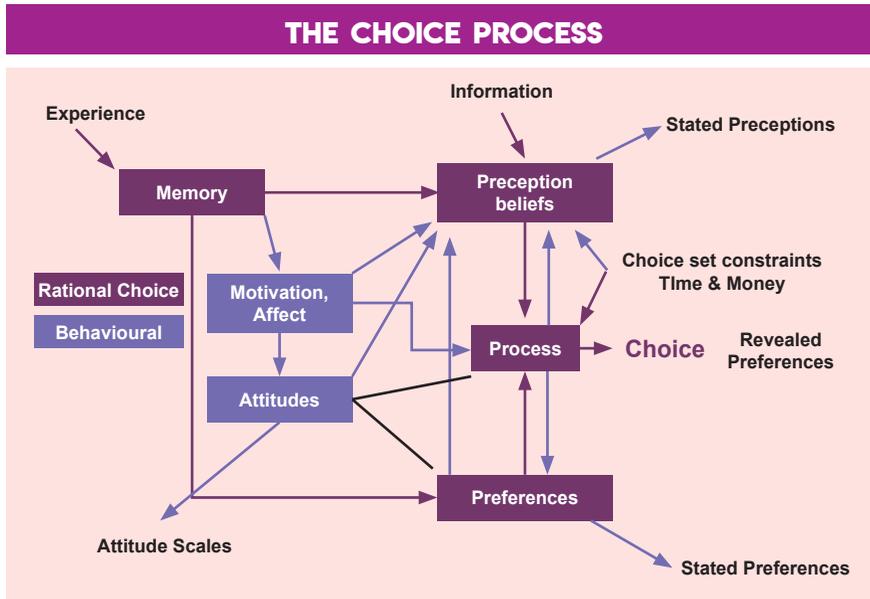
Source : NESTA



**A behavioural change can be a temporary or permanent effect that is considered a change in an individual’s behaviour when compared to previous behaviour.”**

**Bandura (1977)**

WHAT MAKES BEHAVIORAL ECONOMIC GONE WRONG?



Source: McFadden 2001

COGNITIVE BIAS



Source: Braeutigam (2005)

Echoes to the perspective that individual mental architecture is the fundamental to set individual behaviour, there are various challenges posed by the policy makers and industry players to change individual preference and behaviour. One might say that every people would think and react the same in a controlled environment. Does one size fits all applied? Realising that individual cognitive system is mechanically supported by memory, knowledge and belief, it put some pressure on the external environment to motivate and stimulate individual

change behaviour. Individuals tend to be mentally bias when they are provided with limited information, time and emotional intervention that occasionally camouflage the individual judgement and decision.

HYPERBOLIC DISCOUNTING PHENOMENON

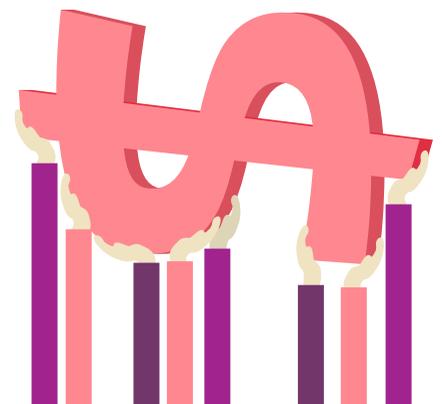
In addition, individual prone to show 'hyperbolic discounting' situation where they tend to predispose one behaviour that arrives sooner rather than later

thus discount the later value due to the instant effect and satisfaction. This makes the individual to make inconsistent decisions and choices over time and often been identified as 'present-biased'. This phenomena often stand against the policy maker and business players dynamism thus posed challenge to the sustainable ecosystem of consumerism and business.

SOCIAL NORMS

On the other hand, social norms play a major role on individual acceptance and behavioural change. This can be seen on consumer behaviour as individual geographical and cultural influence the inclination towards specific behavior. For example, there are different response on people living in the United States and China to the couponing behaviour. People in the United States tend to utilise and value the couponing as compared to China due to confucion belief that emphasise on face saving. Nevertheless, the current spending showed that Chinese American tend to adapt to American culture and inclined towards couponing behavior.

“ Individuals tend to be mentally bias when they are provided with limited information, time and emotional intervention that occasionally camouflage the individual judgement and decision.



## Case Studies!



### HEALTHCARE INDUSTRY -HELPING PATIENTS MAKE INFORMED CHOICES

The NHS is treating more patients now than ever before. High demand has led to long waiting lists for some specialist clinical services, especially in high-density populations. In 2016, the NHS worked with BIT to encourage GPs to refer patients to hospitals with short waiting lists, not just their local hospital, by prompting them with an onscreen pop-up message and colour coding different options (red, amber, green). The trial found that the red flags reduced referrals to busy clinics by 38 per cent in a randomised controlled trial at a hospital trust in East London.



### GOVERNMENT SECTOR -INCREASING TAX REVENUES FOR GOVERNMENT

In 2013, BIT worked with HMRC to increase tax revenues from 'self-assessment' tax payers. Taxpayers were told 'nine out of ten people pay their tax on time'. The trial significantly increased the rate at which people paid their taxes, bringing forward £200 million in tax debt. Since then, the team has helped other international governments with similar experiments. Text message reminders sent to 750,000 businesses in Mexico helped increase tax declaration rates by 37 per cent.



### SUSTAINABLE ENVIRONMENT -EMISSION SAVINGS

Emission savings through behavioural change could be potentially significant. According to one study, consumers behavioural change in the European Union (EU) has the potential over the long run to reduce the EUs CO2 footprint by as much as 25 percent in comparison to business as usual, if a wide range of measures would be adopted. Another study estimated that drastic changes in behaviour could amount to 19-36 percent of global emission reduction from 2020-2050. Highest potential assumably lies in energy use reductions, transport and dietary change.

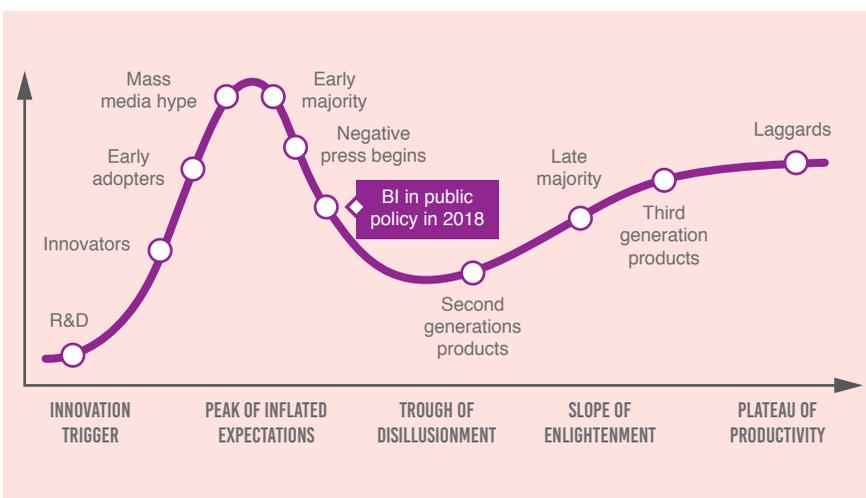
## TRENDS OF BEHAVIOURAL ECONOMICS

Where does behavioral science stand in public policy? And what does its future look like?

One way to explore this question is to draw on the literature of how innovations mature. For example, the Gartner Hype Cycle argues that one can broadly identify five phases of maturity for emerging technologies:

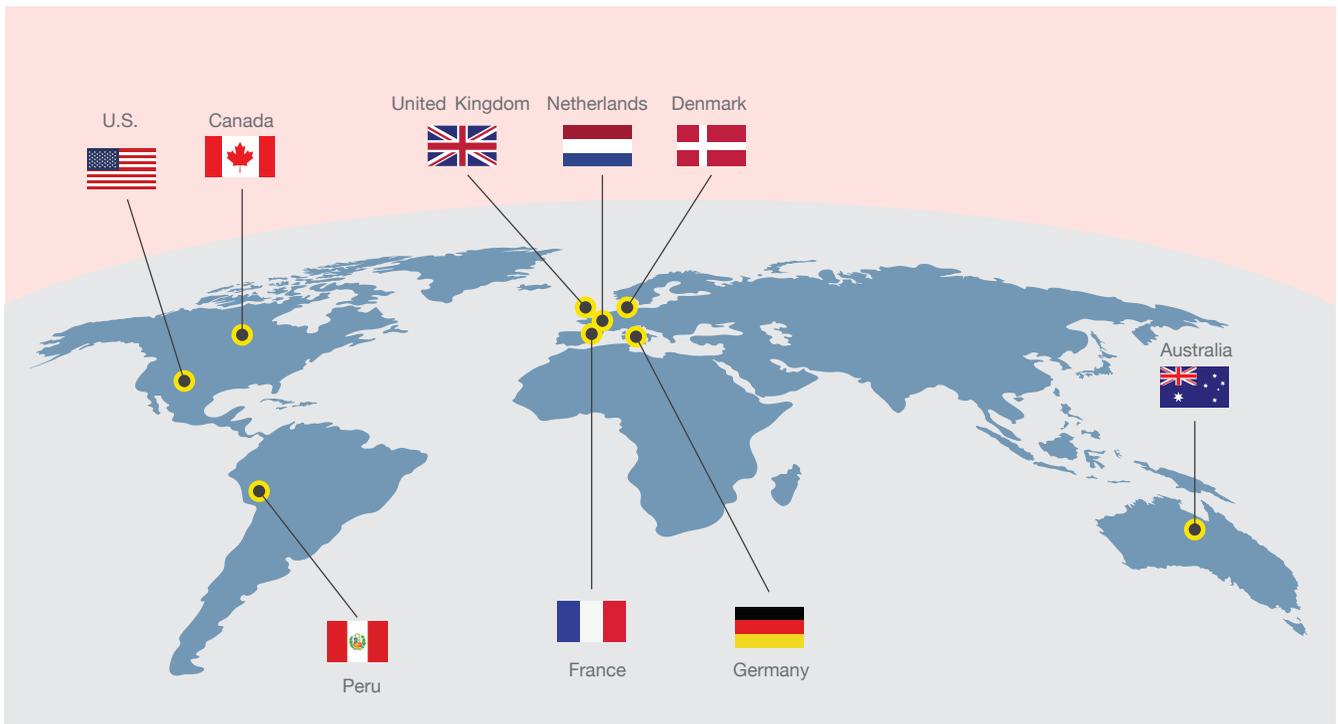
- (i) Technology trigger;
- (ii) Peak of inflated expectations;
- (iii) Trough of disillusionment;
- (iv) Slope of enlightenment; and,
- (v) Plateau of productivity.

### PLACING BEHAVIORAL INSIGHTS IN PUBLIC POLICY WITHIN GARTNER'S 'HYPER CYCLE' OF INNOVATION ADOPTION



Source: Authors based on Fen and Raskino (2009), Buerkli (2016), and Gartner (2016), World Bank

## SELECTED COUNTRIES OF BEHAVIOURAL INSIGHTS



Source: MIGHT Analysis, World Bank 2019



As of November 2018, there are at least 202 public entities all over the world applying behavioral insights to their policies”

(OECD, 2018)

Buerkli suggests that behavioral science was entering a ‘trough of disillusionment,’ as expectations about the promise of behavioral insights in public policy have proven to be overly optimistic.

The spread and form of behavioral science in 10 countries, selected based on being innovators or early adopters in the field: Australia, Canada, Denmark, France, Germany, Netherlands, Peru, Singapore, the U.S., and the UK.

The application of behavioural insights to policy is expanding across Europe.

In some EU Member States, such as Germany and the UK, Centralised behavioural insights teams have been established within the national governments, while in other – e.g. Denmark, France and the Netherlands – ministries have taken the lead. Also at the global level, the World Bank and the OECD have published reports emphasising the importance of identifying and addressing behavioural elements in policy.

### BEHAVIOURAL INSIGHTS DRIVING ECONOMIES

Behavioral insights has posed greater attention among policy makers and business players to understand the effect of public policy to society behavior as some public policy works well in one society and not so well in others. A study by Andrews (2018) that examining the 400 projects of World

Bank has shown that the failure rate is 24 % with regards to the project and product success meanwhile the failure rate is 51% when one takes a broader view of results on the policies impact the development and problem solved. The questions on ‘how often’ and ‘how much it costs’ the failing public policy become mind boggling and challenging among policy makers as the development and implementation of public policy absorbs amountful national resources which approximately 16% of global Gross Domestic Products. Having said that, it is crucial for the policy makers and industry players to embrace that individual predisposition towards specific behaviour involve decision making as postulated by Rational Choice Theory. In fact, greater emphasis on neurobehavioural studies showed that individual behaviour is a choice determined by their neurophysiological reactions on environmental stimuli that reflect their decisions.

## POLICY IMPLICATION

Behaviorally informed policy emphasises the importance of context for decision making and behavior. It examines a wide set of influences, paying attention to the social, psychological, and economic factors that affect what people think and do. It addresses details in bureaucracies, technologies, and service delivery that are often overlooked in standard policy design but that dramatically influence the effectiveness of development programs and projects, especially in low-income contexts. Behaviorally informed policy can provide creative solutions to difficult challenges, often at low cost. Finally, it helps policy makers themselves avoid some of the decision traps and biases that affect all individuals.

Can behavioural insights assist in changing consumers into;

- reduce / dump use of plastic bag
- consume healthy diet
- change financial lifestyle
- saving for retirement
- implementation of subsidised goods in Malaysia

## BUSINESS IMPLICATION

In economic theory, more choices, combination with more competition will result in a cheaper price. However less choices to the products that people tend to be knowledgeable (household product) and more choices to product that people ignorant, will resulted impacted hypermarket. The availability of financial technology has made the payment process more easy. Choice of product and services available online had drive more online than physical store. In this scenario, the unintended consequences of retails signal the future of grocery store where more hypermarket close down as a result. With pseudoscience and social media on the

rise, things like ‘narrative economics’ has facilitated a new industry of social media influencers. Business owner could leverage on behavioural insights in nudging consumers towards betterment.

## CONCLUSION

We have two systems of thinking: the automatic system and the deliberative system. When making decisions, we cannot manage without the automatic system, and it can produce remarkably well-adapted choices at a trivial cost of effort in decision making. The automatic system draws heavily on default assumptions and interpretive frames. It is very sensitive to what is salient and what associations effortlessly come to mind. Having said that, it is crucial for policy makers and business players to stimulate and shift the individual paradigm that reflect sustainable behavioural change in order to avoid costly correction policy and non competitive business

landscape. As suggested by behaviorist scholars the minor and low cost policy changes do have a large impact on the achievement of development goals. The policy mechanisms includes framing, anchoring, simplification, reminders and commitment devices could help people make better decisions and enhance people’s acceptance towards change.

Like other innovative policy initiatives, there is some debate on whether behavioral science is a fad or here to stay, especially given the bureaucratic nature and risk-averse culture within many public institutions. Can it work with the ‘marshmallow effect’ where gratification as key component in behavioural change? Policy makers need to really understand where to use ‘marshmallow effect’ or adopting ‘hyperbolic discounting’. Applying behavioural insights in foresight practice can be at the level of strategy formulation. Due to its nature, user need to review its second and third implications in adoption.

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## ● VIEWPOINTS

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As millennial parents have evolved, so have education systems and methods.

Millennial parents are more sensitive to what their children need.

There was a time when parents thought they knew what was ideal for their children. But now they turn to the internet for everything.



As parents have evolved, so have education systems and methods.



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## THE UNINTENDED CONSEQUENCES OF DIGITAL PARENTING

In the last few years, the word ‘millennial’ has been a much-discussed topic. Ushering in a new era, millennials have become trendsetters in the past decade. During this defining period, millennials have truly cemented their roles. To illustrate, one prevailing trend has caught on around how millennials socialise—albeit virtually, millennials spend hours on end reconnecting with childhood friends, sharing photos and activities on social media. Internet, is central to everything

millennials do. Everything is reachable and accessible via the internet. Gone were the days of bulky GPS devices or tangible maps for navigation. Today, we can simply download a wide choice of navigation applications and use them on our smartphones. Why would you bother going to a restaurant to fill up when you can simply order food online? One no longer has to withdraw cash from an ATM machine when e-wallets can electronically transfer money for almost any kinds of transactions. Things

have become a lot easier nowadays and by contrast, a lot different.

### MOVING TO THE FUTURE

Technology has led to many remarkable innovations. The devices we use every day, for example, were simply unthinkable two decades ago. Commuting to work on a hover board or coordinating team meetings remotely across various locations and time zones are sizzling

technology trends pointing towards the future. Smartphones have become more than just phones. These devices have now become highly capable portable computers. We no longer need to open our laptops to go over documents before attending a meeting. All this can be viewed through our smartphones and tablets. Tech companies such as Apple, Samsung, Microsoft, Huawei, Oppo and many others are jostling to provide better devices, making the mid-range market for mobile devices just as good as flagships. That's how close the competition is. As a rule of thumb, consumers will have to pay more to indulge in better experiences from new devices. This is what's been commonly said as, "the more you earn, the more you can spend." As a result, such notions have prompted unintended consequences. So much so, the devices millennials use today can be said to represent their status quo. On the flip side, it has become detrimental when our youngsters are mired in this mentality. In order to feel accepted, millennials often feel the pressure of having to keep up with the latest technology trends as a virtue of living the millennial lifestyle.

## BOUNDLESS WORLD

Apart from this, social media's direction too has diverged from its intended objective. The consequences of this can be pretty dire to our society. Initially, social media was meant to connect us with our friends and acquaintances. Unfortunately, it is slowly turning the other way around, disconnecting us from the people we have close ties with. For instance, as a consequence of being too engrossed with multiple social media accounts, couples are spending lesser time having conversations together. In addition, people are starting to share almost everything they do and this has turned out to be a benchmark of happiness for some. Despite this, people are only showing the rosy sides of having love relationships, holidays and parenthood among others.



**Millennials who have risen beyond conventional opportunities and tread lesser travelled career paths than their traditional parents are now bustling parents themselves.**

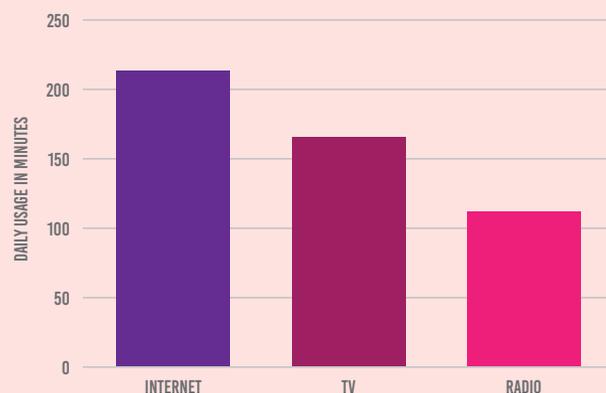
Somehow, they are making others feel insecure and inadequate about what they have. Beauty standards too have become unreasonably superficial. To a degree, this has inflicted millennials and teenagers with low self-esteem and anxiety issues. Oftentimes, the actors of change, or notoriously known as influencers, are promoting a materialistic lifestyle as the ultimate cost of happiness.

## MILLENNIALS AND PARENTING

Millennials who have risen beyond conventional opportunities compared to their traditional parents are now bustling parents themselves. Given the evolving

dynamics of the society, children of millennials, known as the Generation Alpha, will largely be the most formally educated, technologically equipped and wealthiest kids. In terms of parenting, based on a statistic published by J. Clement, in the United States alone, as of January 2017, mothers spent an average of 211 minutes browsing the internet on a daily basis compared to 138 daily minutes on TV consumption. During an autumn 2014 survey, it was found that parents in the United States were frequently giving and receiving support on social media, responding to good news by commenting and liking positive status updates by others. This showed an extensive usage of internet among parents in leading their parenting lives. The downside of "learning" how to be a good parent through social media is that the learners may misunderstand the real essence of becoming good parents. Parenting is certainly complex and it requires real efforts from both parents. Meanwhile, for working parents, it takes a higher threshold of collaborative efforts to juggle work, raising a family and personal life. As such, it is important for parents-to-be to seek out information from the right sources in learning how to lead their parenting lives.

## DAILY USAGE IN MINUTES



Source: Statista.com by J. Clement (August 21, 2019)

It is also worth noting that the usage of gadgets among children is worrying to say the least. Parents should always be aware of the negative impact that may outweigh the benefits of letting their children use mobile devices at an early age. There have been several cases where children exposed to excessive usage of gadgets such as iPads and tablets causing physical and mental damages to children. According to a study, children tend to become overweight and have higher chances of developing seizures and vision problems when they spend too much time with digital devices.

In that sense, it is highly important for new parents to sufficiently educate themselves beforehand in order to avoid these side effects. Malaysia in particular, provides reliable information outlets for new parents to learn about parenting. One of these is a website called The Asian Parent (Malaysian Parenting and Motherhood Advice). This is one of the most visited websites for young parents to gather useful information and tips on how to lead their parenting lives especially for new mothers expecting their first child. This website is highly practical for new parents to learn and connect with others from the same demographic areas. There are tonnes of information shared by real parents based on their personal experience from various backgrounds that include medical professionals such as doctors, nurses, pharmacists and many more. Nevertheless, as consumers, we should not rely too heavily on web-sourced information. We should at least do our due diligence to ensure the information shared is based on facts and not anyone's personal opinions.

For example, this website and countless others can be reliable sources and will come in handy for new parents deciding whether to send their children to play school or pre-school. By looking up for information on the internet, parents can gather and compare a host of varying perspectives, thoughts and opinions to supplement their knowledge. In

Malaysia for example, many parents opt to send their children from the age of 4 to play schools first. This is viewed as an important milestone to develop children's social skills alongside their peers. However, this view may not be relevant in other countries.

## DRAWING THE LINE

Now, children dedicate most of their hours to their mobile phones, computers and digital technologies that have both positive and negative impacts on their lives. In turn, this has intensified parents' responsibilities and challenges to safeguard their teens and tweens from the online dangers.

Where do we draw the line? We can't expect our kids to be mature enough to make good decisions about a highly advanced tech toy without any guidance from us. And how can we anticipate the issues of giving something to our kids that didn't even exist while we were growing up? As parents we need to make an intentional effort to figure out how our kids interact, use or abuse this technology. And look for ways to handle it in a positive way, so this does not turn into a source of constant tug of war and power struggles.

Generally speaking, the speed and range of today's internet are allowing millennial parents to access information from all over the world within seconds. Again, parenting is certainly complex, but there are many ways and streams of information available for parents to plan and fashion their parenting styles. In short, technology brings a host of benefits as long as users know where to set the limit. With the number of millennials raising children expected to grow exponentially over the next few years, this technology trend will only become more widespread. But the question that begs asking is, will technology help millennials raise their children better? Surely, the answer is yes. However, this DIY generation certainly needs education on the basic principles of good parenting without resorting to decisions hastily after looking for reasonable answers from the web.



There is no longer a standard way of educating a child, and children are being given the choice right from kindergarten to study and excel in subjects that interest them.

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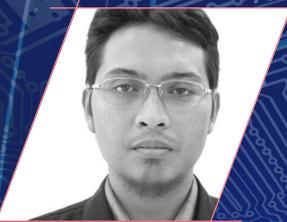
● VIEWPOINTS

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Energy a key enabler of smart city development.

Smart grid concept supports Malaysia's national renewable energy aspiration.

Malaysia targets 20% of renewable energy mix in the country's energy generation by 2025.



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# SMART GRID TECHNOLOGY; REALITY & FANTASY



There are downsides to everything; there are unintended consequences to everything”

– Steve Jobs

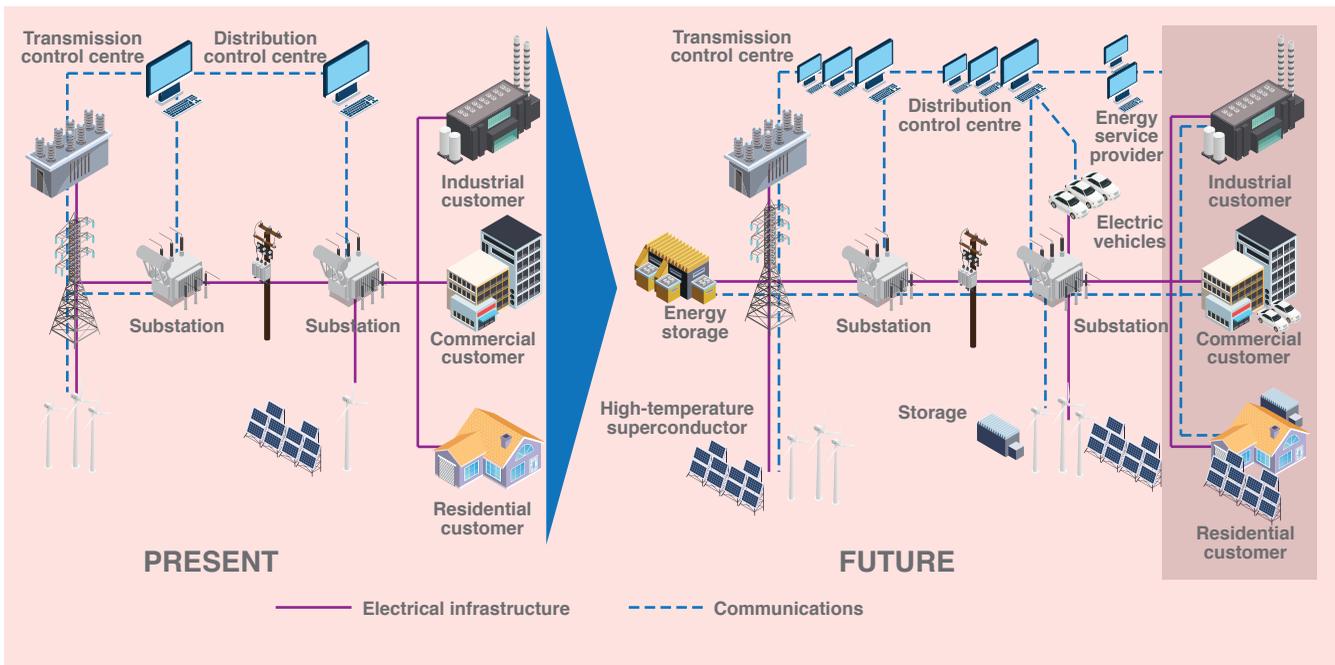
## SMART GRID IN A PERFECT WORLD

The majority of countries around the world today are gearing up to become vibrant smart cities. To deliver multi-sided smart homes and facilities, most countries find themselves in a race to implement Industry 4.0. Intelligent use of energy is one of the key features of smart homes and facilities in order to cut down on our use of fossil fuels. Despite this, utility companies will have a tough call to answer in the immediate future. Soon, they will be asked to align their business strategies and solutions across

government, industry, commercial and residential clients in a bid to provide sustainable energy.

Energy plays a critical role as one of the key enablers of smart city development. Yet, energy supply is tied up with population size and urbanisation [1]. On the other hand, energy provides a fundamental support for sustainable operations of Industry 4.0 technologies—powering equipment, machines and facilities as described by the United Nations Industrial Development Organization (UNIDO) in a special report titled Accelerating Clean Energy through Industry 4.0 in 2017 [2].

**FIGURE 1: SMART GRID CONCEPT [3]**



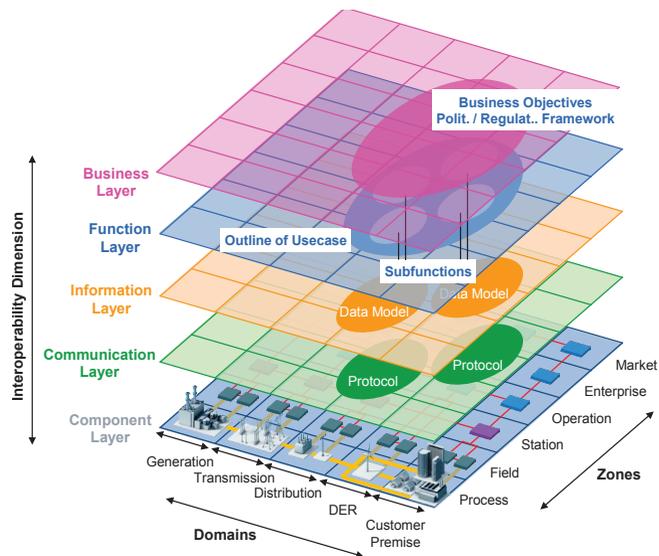
Source: Electrical Engineering Portal

Ageing infrastructure, technical and non-technical losses, inaccurate energy forecasting are complex challenges faced by the industry. To balance the energy generation mix between renewable and conventional sources (due to the lack of integration with sustainable energy technologies), the industry can no longer defer finding a solution. Furthermore, ineffective energy management and the disparity between demand and supply are among key challenges that energy utility companies have to solve to catch up with the latest industrial growth and development trends. As a result, improving the energy supply industry and meeting rising demand are a main concern for utility companies. Supported by a new framework, the smart grid technology is a key enabler that can be adopted to address all these issues. It utilises digitally advanced technologies along the value chain of energy generation, transmission and distribution. On the consumption side, it manages the demand and supply of energy effectively [3]. Figure 1 shows one example of an integrated smart grid architecture and communication system. There are a number of state-

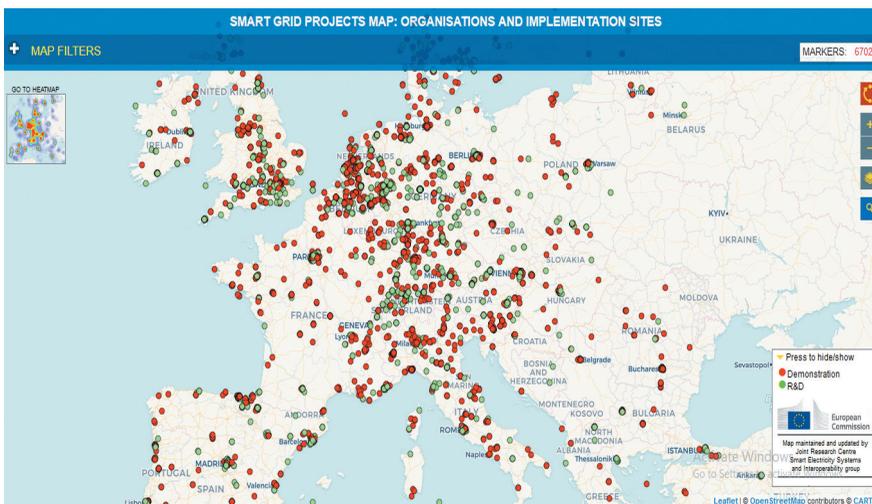
of-the-art architectures in development to complement the system in order to meet the modernisation of the energy industry [4]. Figure 2 shows an example of a smart grid architectural model which consists of multiple integration channels and features. Therefore, this

bi-directional integration with renewable energy sources provides power quality that minimises the interruption of supply. This helps utility companies provide energy to clients in a more efficient and sustainable approach.

**FIGURE 2: SMART GRID ARCHITECTURE MODEL (SGAM) [5]**



Source: Smart Grid Coordination Group

**FIGURE 3: SMART GRID PROJECT MAPS [6]**

Source: The Joint Research Centre

Figure 3 shows a global smart grid project map that comprises of its representation (red dots) and R&D activities (green dots) that appear to be highly concentrated in Europe.

## THE REALITIES AND CONSEQUENCES

As smart grid implementation grows, either at R&D or demonstration level, the numbers however, only represent the framework's introducers and beneficiaries. Without any intention to be critical of anyone, this article seeks to highlight some negative consequences of the smart grid technology derived from actual case studies. On the basis of a global context, ultimately, the breakdown is intended as a lesson for Malaysian stakeholders to consider before jumping on the smart grid technology bandwagon.

### >> INVESTMENT BY CUSTOMER

In African countries, smart grid implementation has become a critical issue after the continent's national utility companies expedited the roll out process following the introduction of a programme called Credited Advanced Payment for Metering Implementation (CAPMI). This however, was a problem inflicted on

consumers who faced resource limitation and were unwilling to finance the installation using their own money.

The improper process of appointing suppliers to carry out smart meter installation wreaked havoc when the process took longer than scheduled and was prone to red tape elements. This led to a counter response when African consumers started to attempt electricity theft, thus posing another stumbling block in the continent's bid to adapt the technology [7]. Since, the rate for non-technical losses has been rapidly declining.

### >> LIMITED BUDGET FOR R&D AND O&M ACTIVITIES

Smart grid investment should also be injected with investment for R&D. Many implementation issues that occur need to be rectified through R&D fixes that require a significant amount of resources. Limited budget allocation and unsystematic R&D endeavours to address on the ground issues will only cause delay to the deployment process as well as inefficient operations and maintenance (O&M) works [7]. R&D, however, will only deliver real solutions if it is coupled with commercialisation (R&D&C) in order to reap the full benefits of the initial investment made.

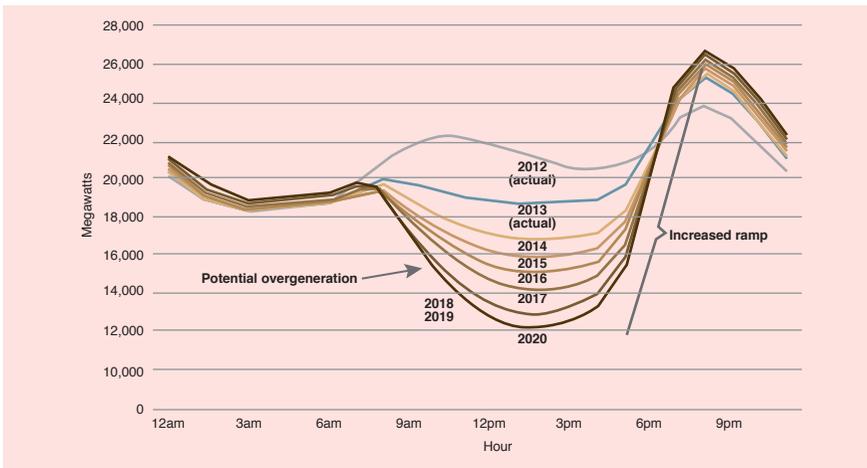
### >> CYBER-ATTACKS

Cyber-attacks are one of the major threats to smart grid facilities. Cyber-attacks may prompt the interruption of energy supply and demand. Given that smart grids highly depend on IoT, smart grid facilities are vulnerable to the crippling damages of cyber-attacks. Hence, smart grid systems must be backed and associated with well-structured cyber-security measures to be more resilient. As reported globally, the investment spent to combat cyber-crimes was around USD445 billion yearly [8]. Multi-layered cyber security protocols need to be put in place in view of the grave damages of energy disruption that cyber-attacks can impose.

### >> IMBALANCE GENERATION MIX AND DUCK CURVE

Some countries are facing duck curve related issues. In utility-scale electricity generation, the duck curve is a power production graph over the course of a day that shows the timing imbalance between peak demand and renewable energy production. Higher penetration of solar PV energy and the imbalance of renewable energy injection can cause a host of problems to smart grids. This will strain utility companies' operations as a result of having to deal with the trouble of managing voltage fluctuation and difficulty in order to keep thermal stress of assets at bay. As the system network is incapable of coping with multiple variables of load injections, it will cause consumers to experience over-voltage, which may result in inverters switching off during daytime. Another issue which may arise includes the lack of live data visibility from systems and languages from various technology providers. This set of data is crucial for utility providers to conduct further analysis and chart future service improvement. [9] As a recommended strategy, the Load Dispatch Center may need to conduct frequent load-demand forecasts and factor in other key data variables that can cater to all probable energy scenarios.

**FIGURE 4: THE DUCK CURVE** [10]



Source: Office of Renewable Energy and Energy Efficiency

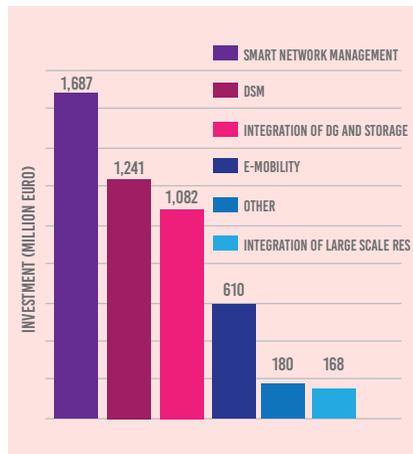
**>> INVESTOR INTEREST**

In some countries that involve smart grid deployment, investors will surely face issues in managing their resources. Understandably, each investor will have their own preferred areas of investment. As shown in Figure 5, European countries dominate and focus more on smart network management at 34% followed by demand management at 25%. European countries however are less focused on e-mobility and integration, with only a fraction of the total investment amount going to the development of scaling up renewable energy sources [11]. Therefore, to balance the vested investment interests and the technical capabilities of vendors, a common understanding needs to be reached around local product compatibility, foreign direct investment (FDI) and “domestic direct plus indirect investment (DI)”. All this needs to be ironed out to safeguard Malaysia’s national agenda in the context of energy security.

**>> CONSUMER PERCEPTION**

Malaysia has kicked off its smart grid implementation strategy with the installation of smart meters for residential in *Melaka*. Done in phases,

**FIGURE 5: INVESTOR INTERESTS BASED ON SMART GRID AREAS** [11]



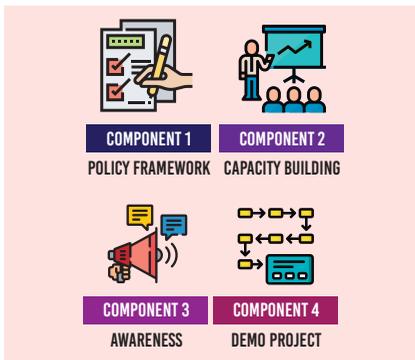
Source: MIGHT Analysis

**FIGURE 6: TNB ENGAGES CONSUMERS ON INACCURATE ELECTRICITY BILL ISSUE** [13]



Source: TheStar and TNB

the strategy is supported by advanced metering infrastructure (AMI). However, in May 2019, the adoption of smart meters has raised one major concern by the public, urging Malaysia’s national utility company to implement the system thoroughly and allow energy consumption to be monitored with consistent and precise data generation displayed at the meter. In addition to this, sceptics argued that the installation had cost consumers higher electricity bills in comparison with the previously used system. In response, these issues were further investigated by a special task force from the national utility company together with the ministry and local authorities in a bid to resolve the concerns. The initiatives engaged consumers via a special program to disseminate information on smart meter information. Of these, clarification of meter tampering and consolidation of reports issued by the public as well as reimbursement for any overcharges and on-site smart meter inspection were also carried out [12]. As a result, a comprehensive workaround between the ministry, regulators, consumers, the communities and local authorities was concluded as a vital element in achieving a successful smart grid project deployment.

**FIGURE 7: SMART GRID PROJECT COMPONENTS** [15]

Source: MIGHT Analysis

## REINVIGORATING THE ENERGY INDUSTRY VIA SMART GRID FOR OUR FUTURE LANDSCAPE

As of now, there are 300,000 units of smart meters installed in Melaka. Malaysia will continue the effort progressively and the project is moving towards 1.2 million meter installations in Klang Valley this year. By 2026, it is expected that 9.1 million Malaysian households will be equipped with Tenaga Nasional Berhad (TNB) smart meters in peninsular Malaysia [14].

In part, MIGHT is leading an advanced role to further the high tech industry's development. MIGHT is also overseeing the implementation of a holistic smart grid approach in Malaysia under the development wing of Global Environmental Facility (GEF) 6 of Sustainable Cities Development under UNIDO which consists of four key components including policy framework, capacity and awareness building programmes and project demonstration. This project will be mobilised in a collaboration with stakeholders namely Energy Commission, TNB Research (TNBR) Sdn Bhd, UNITEN and Perbadanan Teknologi Hijau Melaka.

Most importantly, lessons learnt from other countries should be taken into consideration and leveraged to Malaysia's advantage in accelerating smart grid development. This goes to ensure that Malaysia is well prepared with hindsight in relation to some of the unintended consequences that occurred previously across other parts of the world. Meanwhile, onto the project's aspiration, the due diligence will certainly provide added values to the on-going high-tech project development. MIGHT, together with its partners, believe that there is a need to provide comprehensive awareness for the public on smart grid implementation. In turn, this will promote a soft landing for the project's acceptance by the public. Also, policy deliberation that affects public opinions needs to be emphasised and adequately addressed. By building alignment with all related stakeholders, this will contribute to better policy instruments and boost the project's implementation timeline. Advocacy of the smart grid development too needs to be ramped up nation-wide to make sure a successful deployment formula is repeatable for other states and cities to follow.

In addition, capacity building will nurture Malaysia's local talents. In a sense, managing various technology components in smart grid development and demonstration will provide a baseline understanding in the integration of various sustainable energy technologies. In the demand and supply equation, how these new technologies can be seamlessly integrated with existing conventional energy generation plants have to be a tenable proposition understood by all. At the end of the day, concerted efforts that spanned policy framework, capacity and awareness building as well as project demonstration in *Melaka* will provide breakthrough inputs for Malaysia's national utility company, TNB. Effective smart grid project deployment and energy management are the way of the future to achieve sustainable energy as demanded by Sustainable Development Goal (SDG) 7 in ensuring access to affordable, reliable, sustainable and modern energy for all. Ultimately, the smart grid concept supports Malaysia's national renewable energy aspiration. This bodes well with the national 20% target of renewable energy mix in the country's energy generation by 2025.

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## IT'S A WILD WORLD: UNDERSTANDING THE IMPACT OF TECHNOLOGY IN EVOLVED WORLD.

We're committed to growth by scaling new technologies to inflate the world economy and supply limitless consumption to everyone. Oftentimes, technological disruptions can be seen shaking up critical world ecosystems; impacting social, economic and political changes and making the world more complex than what it already is.

Unintended consequences sometimes occur with very little warning. While technology isn't always positive, by understanding the impact, we will be able to see behind the numbers and the real cost of technology adoption. In this article, we look at unintended consequences of technology through animal metaphors.

### "THE ELEPHANT IN THE ROOM"; DIGITAL NATIVE DILEMMA

Digital natives were generally born in the digital era, after the widespread breakthroughs of advanced technologies.

Their development is believed to have been influenced by technology like the internet, social media and mobile.

Organisations however adopt new technologies to renew their new competitive advantage despite issues around readiness.

For digital natives, many think that digital natives are digitally literate and savvy. However, this assumption is totally wrong.

Digital natives might be familiar with technology. But they are not technical experts of new and specialised technologies.

The problem with "assuming" digital natives are experts in the economics of innovation and new technologies is turning out to be the elephant in the room.

### AUTOMATION AND ROBOTIC THE "ASTEROID" TO DINASOURS EXTINCTION

Emerging technologies such as automation, robotics and artificial intelligence are encroaching most jobs and working environments.

Expert professionals and 3D (dirty, dangerous and difficult) jobs a.k.a "dinosaurs" and "dodos", will be extinct, superseded by new technologies.

Jobs that are known to be sexy and of high value too, might soon disappear. Similarly, jobs that are known to be dangerous, dirty and difficult are being replaced by robots and automation; leaving many workers unemployed.

Are we ready to be extinct like "dodos" and "dinosaurs" in the job world?





## CYBERCRIME AS A BLACK SWAN EVENT; A RESULT OF PEOPLE IGNORANCE

Communication is more fluid than ever. As such, digital security has become a critical aspect in preventing harmful cyberattacks.

Malaysia has put together a massive effort in order to prepare adequate infrastructure for cybersecurity.

Currently, Malaysia ranks eighth in the global cybersecurity index (GCI, 2018) and second in Asia Pacific, scoring the highest across organisational and capacity building segments.

In addition, Malaysia has the expertise to provide digital forensic services—multimedia forensics, mobile phone and data recovery services, biometric forensics, cloud computing forensics and big data analytics.

Often times, ignorant behaviour is the main culprit of cyberattacks. Ignoring alarming issues and waiting until things come to a head before taking action are costly.

Cybercrime could become a black swan event (the probability of occurrence is low, yet poses high impact) despite all the cybersecurity measures in place.

## BEWARE OF JELLYFISH STINGS; THE SIDE EFFECTS OF SOCIAL MEDIA

For good or bad, social media has unleashed a new trend, which has seen the proliferation of personalised content being put up by its users.

Meanwhile, for businesses, social media is a hotbed for energetic digital marketing activities.

Despite all these, social media has a dark side.

**Social media is like a jellyfish at the seashore;** nice to see, but not to hold or touch because it has a harmful sting. It is important to set a limit and know when to take a break.

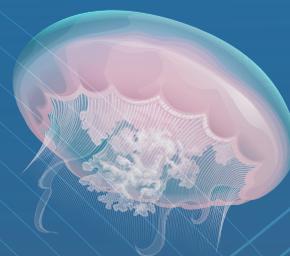
New studies and reports are raising concerns about the dangers of social media addiction.

Chances of having depression and anxiety are higher among those who are too engrossed in their daily social media activities. A study indicates that users with “heavy use” of social media have between 13% and 66% higher chances of being depressed.

Addiction to social media can also lead to anxiety disorder. This occurs when a person is unable to check their social media accounts often enough.

## CONCLUSION

In conclusion, the unabated development of Industry 4.0 technologies will continue to help the world evolve. However, common sense will no longer drive the evolution. Thus, preparing for technology’s unintended consequences will bring about a new dimension and improve our readiness for any future complexities and uncertainties.



## ● INTERCONNECT

myForesight®

# HAPPENINGS

## FUTURE OF CONSUMERISM & DOMESTIC TRADE

25<sup>th</sup> September 2019, Malaysian Direct Distribution Association



Judging by emerging economic and technology trends, a rebalancing of global trade and distribution towards Asia is already overdue. Also, as Industry 4.0 is set to unleash an unprecedented digital disruption, each opportunity is paired with a set of challenges across the entire value chain impacting production, distribution and consumption of goods and services.

One thing to note going forward is the transformation of consumer behaviour and consumerism as a whole. Digitally enabled, digitalisation is remaking the way consumers traditionally discover, evaluate, purchase and consume products and services as consumers are becoming more connected and empowered.

In light of this, on the 29<sup>th</sup> of September 2019, MyForesight® convened a foresight session with the Malaysian Direct Distribution Association (MDDA) on how to navigate the

impending realities of global trade and Industry 4.0. In short, the session highlighted global mega trends and the implications of digitalisation to consumers and domestic trade. Following the presentation, a networking session took place with MDDA members to further discussions on the issues as a part of an awareness drive aimed at gearing up the direct distribution fraternity. Overall, the programme is a part of MIGHT®'s structured engagements series designed to boost national capacity in foresighting and futures thinking.

## ASEAN FORESIGHT ALLIANCE WORKSHOP

11<sup>th</sup>-12<sup>th</sup> December 2019, Dorsett Hartamas



What role will ASEAN countries play in addressing pressing global challenges over the next decades? And how can public and private stakeholders position themselves to manage threats and capture opportunities from the transition to sustainable technologies and practices?

On the 11<sup>th</sup> and 12<sup>th</sup> December 2019, the Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC) and Academy of Sciences Malaysia (ASM) organised an ASEAN Foresight Alliance Workshop.

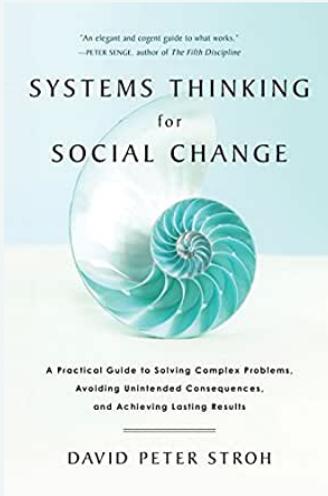
Facilitated by MyForesight®'s Dr. Tan Shu Ying and Dr. Liz Alexander, the training was designed to gear up ASEAN member countries' officials with leading foresight thinking and practices to address the opaque nature of a technology-disrupted future.

Despite a rush of interest in Industry 4.0, the workshop provided participants a clear blueprint to enhance the effectiveness of their long range planning through the application of futures thinking tools. Of these, the training walked participants through tools such as emerging issue analysis, future triangles, macro-history, causal layered analysis, (macro, meso and micro levels), visioning and back-casting.

Held at the Dorsett Hartamas, Kuala Lumpur, going forward, it is hoped that a network of ASEAN countries working together will emerge as key actors for global change. As in other regions, ASEAN countries will need to build outward-looking alliances with that go beyond existing domestically focused joint efforts. This will, perhaps, be a longer, slower development and will require more similar efforts to be put in place.

## ● INTERCONNECT

# myForesight® BOOK CLUB



**ISBN-10:** 160358580X  
**ISBN-13:** 9781603585804  
**Author:** David Peter Stroh  
**Publisher:** Chelsea Green Publishing (24 Sept. 2015)

### SYSTEMS THINKING FOR SOCIAL CHANGE: A PRACTICAL GUIDE TO SOLVING COMPLEX PROBLEMS, AVOIDING UNINTENDED CONSEQUENCES, AND ACHIEVING LASTING RESULTS

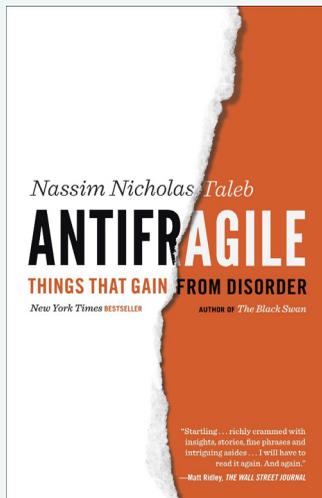
Donors, leaders of nonprofits, and public policy makers usually have the best of intentions to serve society and improve social conditions. But often their solutions fall far short of what they want to accomplish and what is truly needed. Moreover, the answers they propose and fund often produce the opposite of what they want over time. We end up with temporary shelters that increase homelessness, drug busts that increase drug-related crime, or food aid that increases starvation.

How do these unintended consequences come about and how can we avoid them? By applying conventional thinking to complex social problems, we often perpetuate the very problems we try so hard to solve, but it is possible to think differently, and get different results.

Systems Thinking for Social Change enables readers to contribute more effectively to society by helping them understand what systems thinking is and why it is so important in their work. It also gives concrete guidance on how to incorporate systems thinking in problem solving, decision making, and strategic planning without becoming a technical expert.

Systems thinking leader David Stroh walks readers through techniques he has used to help people improve their efforts to end homelessness, improve public health, strengthen education, design a system for early childhood development, protect child welfare, develop rural economies, facilitate the reentry of formerly incarcerated people into society, resolve identity-based conflicts, and more.

The result is a highly readable, effective guide to understanding systems and using that knowledge to get the results you want.



**ISBN-10:** 0812979680  
**ISBN-13:** 978-0812979688  
**Author:** Nassim Nicholas Taleb  
**Publisher:** Random House Trade Paperbacks; Reprint edition (January 28, 2014)

### ANTIFRAGILE: THINGS THAT GAIN FROM DISORDER (INCERTO)

Antifragile is a standalone book in Nassim Nicholas Taleb's landmark Incerto series, an investigation of opacity, luck, uncertainty, probability, human error, risk, and decision-making in a world we don't understand.

The other books in the series are Fooled by Randomness, The Black Swan, Skin in the Game, and The Bed of Procrustes. Nassim Nicholas Taleb, the bestselling author of The Black Swan and one of the foremost thinkers of our time, reveals how to thrive in an uncertain world.

Just as human bones get stronger when subjected to stress and tension, and rumors or riots intensify when someone tries to repress them, many things in life benefit from stress, disorder, volatility, and turmoil. What Taleb has identified and calls "antifragile" is that category of things that not only gain from chaos but need it in order to survive and flourish.

In The Black Swan, Taleb showed us that highly improbable and unpredictable events underlie almost everything about our world. In Antifragile, Taleb stands uncertainty on its head, making it desirable, even necessary, and proposes that things be built in an antifragile manner. The antifragile is beyond the resilient or robust. The resilient resists shocks and stays the same; the antifragile gets better and better.

Furthermore, the antifragile is immune to prediction errors and protected from adverse events. Why is the city-state better than the nation-state, why is debt bad for you, and why is what we call "efficient" not efficient at all? Why do government responses and social policies protect the strong and hurt the weak? Why should you write your resignation letter before even starting on the job? How did the sinking of the Titanic save lives? The book spans innovation by trial and error, life decisions, politics, urban planning, war, personal finance, economic systems, and medicine. And throughout, in addition to the street wisdom of Fat Tony of Brooklyn, the voices and recipes of ancient wisdom, from Roman, Greek, Semitic, and medieval sources, are loud and clear.

Antifragile is a blueprint for living in a Black Swan world.

Erudite, witty, and iconoclastic, Taleb's message is revolutionary: The antifragile, and only the antifragile, will make it.

Praise for Antifragile

"Ambitious and thought-provoking . . . highly entertaining."—The Economist

"A bold book explaining how and why we should embrace uncertainty, randomness, and error . . . It may just change our lives."—Newsweek

## MAP THE FUTURE

As a stakeholder and strategic policymaker, you can contribute by voicing out your opinion to help us map out the desired collective future for Malaysia.

This is an invitation by **myForesight**<sup>®</sup> to every member of the public. If you think we could have done better or perhaps you would like us to cover a specific topic in the study of Foresight or better yet, you would like to contribute an article, we would love to hear from you.

Send your feedback and get in touch with us at [foresight@might.org.my](mailto:foresight@might.org.my)

Website: [www.myforesight.my](http://www.myforesight.my)

We look forward to hearing from you.

**myForesight**<sup>®</sup> team

