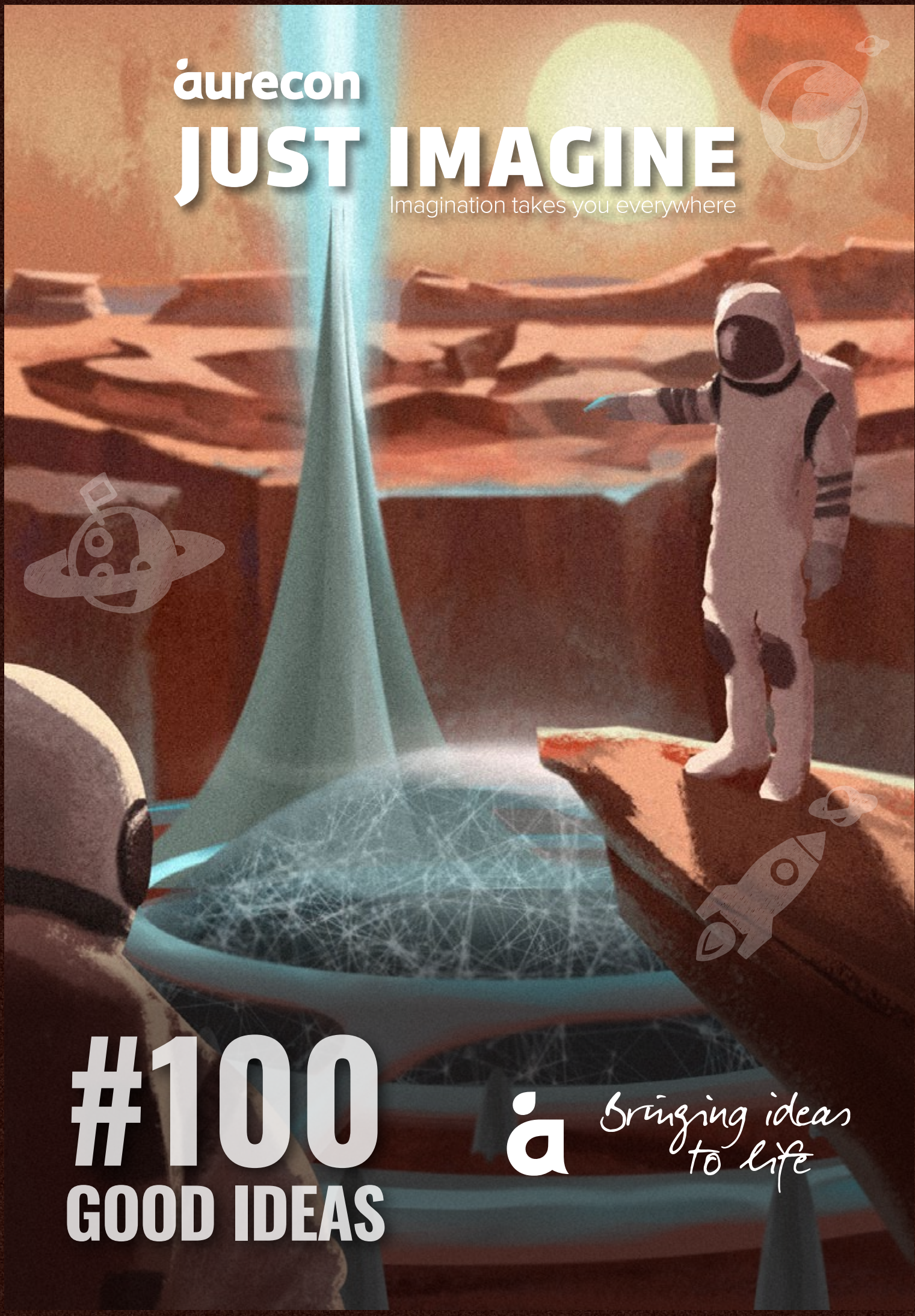
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JUST IMAGINE
Imagination takes you everywhere
#100
GOOD IDEAS
Bringing ideas to life

FOREWORD

Just Imagine: #100GoodIdeas

All ideas sound crazy at first – just ask Elon Musk.

If you had asked us two years ago if we thought we would ever reach 100 blogposts for our Just Imagine website, we wouldn't tell you it's crazy. We would tell you it's **possible**. Because that's what Just Imagine is all about – pushing boundaries and imagining what might be possible if we challenge the status quo, asking "What if...?" and "Why not...?"

For the past 24 months, we have explored a broad spectrum of futuristic ideas, theories and ideologies that are shaping the way our world works, regardless how out-of-this-world they may be. Our minds have drifted to the vast universe of our imagination, believing that despite all impossibilities, when we have the right reasons, everything is **probable**.

This book celebrates all 100 good ideas that our **Just Imagine** blog has shared in the form of an e-book which showcases thought-provoking and powerful arguments surrounding business, leadership, engineering, technology, innovation, sustainability and the future of our workforce.

As we bring ideas to life at Aurecon, we hope these 100 good ideas will inspire future ready thinking now and into the future; and encourage more people to explore and discover what awaits us tomorrow...

Two years, 100 blogposts. It's not so crazy now, is it? **Just Imagine**.

Kourosh Kayvani
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THEMES

1

A DIGITAL FUTURE

WHAT AUTONOMOUS VEHICLES CAN LEARN FROM THE HORSE & CARRIAGE

John Gottler, John Cranley & Blair Monk

The autonomous vehicle with all its Google-esque lustre (no need to concentrate on driving; the eradication of fatalities; and lower cost fuel consumption) has been hailed as the inevitable evolution of transportation mobility. Fast forward ten years, and we will whip out our smart phones and book an autonomous ride to work from our doorstep.

But although **autonomous vehicles** are set to revolutionise the way we travel – the article "The Big Shift Last Time: From Horset Dung to Car Smog" cautions that "The rise and fall of the horse makes very clear the difficult and troubling character," of transitions.

When it comes to mobility, is there really a fast track to progress?

Not a smooth path

By 1890, a New Yorker took over 290 horse-car rides a year, but as we reached 'peak horse', so too did the variety of social ills these beasts created, e.g. inordinate amounts of manure a day. As a result, the automobile was hailed as the saviour, which would result in cleaner streets, reduce congestion and restore order to the chaos of city streets.

In reality, however, the demise of the horse was, as the author puts it, "a protracted drama that took… the messy adoption of three fossil-fuel technologies. Steam engines replaced the horse for long-distance haulage (travel); coal-fired electricity made the horse redundant for public transit, and the combustion engine eradicated the horse as a prime mover of individuals and most goods."

In today's terms, although the transition will be more rapid, getting from a point in time where all vehicles are driven by humans, to a point in time where all vehicles are automated, given the scale and size of our cities today, is set to be far more complicated than the horse to car transition.

Are we ready?

Legally, the advent of the car saw the introduction of various acts in countries around the world (also known as the Red Flag Laws). These acts required all self-propelled vehicles to be led by a pedestrian waving a red flag to warn bystanders of the vehicle's approach and assist horse-drawn carriages to pass safely.

Today's autonomous vehicles, which use cameras to 'see' where the road is and sensors to 'locate' the position of obstacles, will require far more fundamental changes to our road infrastructure. If their operation is to be enhanced, we will need to implement accurate GPS; broadcast traffic signal timing; and improve signage and road markings, not to mention fundamental changes to car insurance; our current ownership model; Apps for phones and essential intelligent traffic management infrastructure upgrades.

Although 'beneficial', we must also remember that the transition to the motor vehicle wasn't a panacea in itself. Norton-Greene's article notes that it "did not end the chaos in industrial cities but merely complicated and magnified the movement of people and stuff. Cars didn't clean up cities but replaced stationary piles of dung with invisible clouds of pollution that moved with the wind". Coupled to this, the transition was exacerbated by congestion to include traffic fatalities and serious injuries which no community could afford. As fuel consumption rose, so did the price of oil to a captive, growing car community.

Fast forward a few years, and we will be faced with widespread job losses that will require reskilling of a major portion of the population. In addition, if **electric** autonomous vehicles are widely adopted, what will the effect be on the oil price, oil dependent business and taxation for governments?

It's these not completely foreseeable consequences that we need to get better at predicting and planning for, if a more successful transition is to be achieved this time around.

Paradoxically, we need to consider extremely carefully the journey to autonomous vehicles that we're now taking, as opposed to the vehicles themselves. One hundred years on, may it be said of us that we didn't treat autonomous vehicle as the 'quick fix' to our current conundrum. Herein lies the challenge for today's consulting industry.

ARE OUR UNIVERSITIES AT RISK OF BECOMING IRRELEVANT?

Kourosh Kayvani

The landscape of the educational system in which universities operate is shifting. Online learning and massive open online courses (MOOC) have meant learning content is now easily accessible to all. In many instances, access to information is actually free. This is forcing universities to rethink their place in the educational ecosystem and the value they provide to their clients.

In a world where information is free and government funding is constrained, universities have had to find new sources of revenue. While rankings based on research will remain important, finding ways to fund that research is becoming ever more complex. Increasingly, universities have had to embrace commercial realities and become businesses. Subject to the same conditions as businesses, they are being forced to 'compete' and the pressure to differentiate themselves and add value for their clients is mounting.

Competing against their natural competitors, being other universities, is one thing. Competing against new and unexpected disruptive models of education delivered through the internet is something entirely new. The gloves are off, and universities are in a fight for their relevance and survival.

The problem is that many of them don't realise it yet. To stay in business, like all businesses, they need to be more attractive to their customers: they will need to find a way to ensure prospective students are knocking on the door to get in and that they are cornering the precious few research dollars from industry or government that are available. Achieving this goal starts with one very simple question, but one that many **universities** struggle to answer. That question is: "Who is your client?"

What would happen if a university could 'guarantee' that the students who graduated from their institution would have a better chance of securing an amazing job, and at an excellent salary? Would that university be more attractive to prospective students? What if that university worked intimately with industry to help industry provide better solutions to their clients and, at the same time, synthesised this information to understand exactly what industry requires of its future workforce, and then used the outcome of this synthesis to coach their students to deliver on that need?

To deliver on this 'guarantee', universities need to think about becoming the students themselves. They would have to apply the well-known business principle of 'knowing your customer inside out'. They would have to understand the needs and the changing paradigms of their students' prospective employers and then tailor their product (their students) to industry's needs.

In a **study conducted in the US last year**, only 23% of employers said that recent graduates are well prepared for applying their knowledge and skills in the real world. If industry will one day provide university students with jobs, then 'industry' is arguably a university's most important client. This is a new way of looking at things. It would challenge the status quo and how most universities see themselves. Most companies view the person who pays their bills as their customer. But, enlightened businesses are seeing their clients' customer as the new customer. Successful businesses are focusing on making their clients' businesses more successful by making them more attractive to their customers.

The **engineering industry**, which itself is undergoing significant disruption, would have a far better idea of the sort of engineering graduate they require to remain relevant to their customers than anyone else. If universities are not closely connected to what is going on in the engineering world, and what it is that this world requires an engineer to be in terms of skill sets, capabilities and offerings, then how would they know what type of graduate to provide this industry in the future?

If **universities are to remain relevant** in a world of constant disruption, reimagining who their client is would be a powerful action. If they did this, they would interact with industry in totally different ways. Through designing their courses and their campuses differently for interactivity between disciplines, and co-designing them with industry, the result would be students that remain highly relevant to the future of their clients.

Arguably, this is the approach that **universities** will have to adopt if they are to remain relevant. If they do not, they risk losing the support of their real clients.

NAVIGATING A DIGITAL FUTURE – WHY IT'S TIME TO LEAVE THE CAVE

Stuart Cassie

Over 2400 years ago, Plato told a story of a group of people chained up in a cave facing a blank wall. His famed 'Allegory of the Cave' depicted a world where a group of prisoners was entertained only by shadows from the light of the fire behind them. This flickering view of silhouettes became their sole reality. When one was freed, he turned his backon the wall and was temporarily blinded by the light of the fire.

Once he recovered, he became curious enough to leave the cave and experience a superior, yet incomprehensible, new world. He returned to the cave wanting to share his experience but, now accustomed to the sun, was blinded by the darkness. The prisoners believed that whatever existed outside the cave caused his blindness and, in their ignorance, refused to be dragged from their cave.

2400 years later, could this 'cave' metaphor be applied to how we've adapted to our new digital world? **Many businesses believe they're 'forward-thinking'** and have escaped the 'cave' of analogue to 'see the light' of digital – but the question begs: have we even left the cave yet? Or have we only made it as far away from the wall as the fire? We might 'think' we've escaped the cave, but if we understood what's really possible, we'd realise we have a long way to go before we can truly call ourselves 'freed' of analogue.

Fast forward to 2013, when DreamWorks created a beautiful 3D animated film called **'The Croods'**. It too tells the story of a cave-dwelling family. They are governed by an overprotective and stubborn patriarch, Grug, who refuses to believe that life outside of the family cave can ever be safe. His curious teenage daughter, Eep, is coaxed out of the cave by a torch of fire, where she meets an inventive and forward-thinking boy named Guy, who warns her of an impending apocalypse. Grug, fearful of change, is not convinced by this 'different' and 'new' way of thinking, and bans Eep from seeing Guy.

When a massive earthquake destroys their cave, they're forced to flee their home. With their lives irreparably disrupted, Grug has no choice but to listen to Guy and allow him to guide his family to the safety of a mountain, where Grug retreats to his old ways of thinking and insists that his family hide out in a new cave. His family refuse, saying they don't want to 'survive' but to 'live' in a new, safe land that Guy calls 'Tomorrow', a place where a person's curiosity is allowed to flourish.

Certainly, engineering is one of the last bastions of analogue. We're making incremental steps forward but, compared to other sectors, we probably haven't left the cave yet. Even though **digital technologies** are generally seen as enabling collaboration on design projects or **infrastructure** management and optimisation, there are still trust issues around sharing information between partners due to legacy contractual structures, IP concerns and data security. We're suspicious, and we prefer the comfort of what we know.

Is there ever a 'right' time to leave the cave?

Both these cave stories relate to one of our primal behavioural instincts of safety and the cautionary tale that the grass isn't always greener somewhere new. Of course, there's invariably been an element of risk in leaving the cave but, as Grug shows us, there's always an element of risk in staying, too. We'd all prefer to be Guy rather than Grug, but we'd also like to know what 'Tomorrow' looks like before we make our metaphorical move there. We also know that with something as invisible as digitisation, that's impossible.

If we think of the freed prisoner as a dot-com pioneer or early digital adopter, who was temporarily burnt by his experience, then his fellow prisoners are his peers, who vowed never to fall into the same trap. They stayed in the cave, while he ventured back into the sunlight and carried on exploring and **learning about the new digital horizons**. Today, his extensive knowledge of both the analogue cave and the digital new world gives him a significant advantage over his peers who, unless they change, risk certain extinction.

You have to know how to step out of the cave

The **Johari Window model** is a very useful tool for gaining even more self-awareness, which we can adapt to look at our blind spots of knowledge. Let's call it the Four-roomed Johari Cave.

Clearly you and your organisation want to be residing in Room 3, where your extra digital knowledge can create opportunities that exist because of your competitors' knowledge gaps. You'll also need to be up-to-date with everything that's happening in Rooms 1 and 2 if you want to maintain your advantage and maximise your opportunities.

Yet, interestingly, Room 4 is the most important of all. It's in here that the next, yet unwritten, chapter of our **digital future** will unfold. The best way to prepare your organisation for whatever comes next in the digital space is to place yourself as far away from Rooms 1 and 2 as possible, and as close to Room 4 as you can get.

What's lurking outside the cave?

The attainment of a **built environment** which is digitally enabled, monitored, responsive and optimised has the potential to be one of the defining developments of the 21st century. **Digital engineering** has the potential to enable countries to realise not only all of the inherent value in building its infrastructure assets, but, more importantly, harnessing an ever growing body of data to better manage the assets through their life cycle. This

becomes even more critical with the appreciation that approximately 80% of the assets' costs are incurred in the operational phase, dwarfing development costs.

Therewill be many complexities, some of them terrifying, such as new contractual models and data sharing, as we leave the cave behind. **Governments** looking to drive a digital economy and infrastructure for their nations need to understand that applying current day thinking to an unknown future simply won't work. We have to understand that our knowledge is only beginning to form before we lock down 'immovable' strategy.

Our fear of the unknown is often our greatest fear. Yet, if Plato was still around today, he'd urge us to be more like Guy and less like Grug as we journey towards 'Tomorrow'. Stepping into the digital light will require exploring the unknown and expanding our horizons – but at the very edge of the unknown, we'll discover a new world exists.

AVOID DIGITAL FAILURE – TAKE CHARGE OF YOUR DIGITAL DESTINY TODAY!

Danielle Bond

Look around you the next time you catch a plane or wait in a queue at the bank – everyone is on their smartphone, faces buried in a sea of emoticons, 24/7 email and constant notifications from social networking sites. The iPhone has been hailed as an intuitive, fast-fix for the technically challenged amongst us. Buy an iPhone, and your individual 'digital strategy' solutions are solved.

In the same way, countless organisations are looking to software vendors to solve their digital woes and the adage "There's an app for that" is fast becoming synonymous with streamlining core business processes. Sometimes, this equates to being smart about things – but are we relying too heavily on these conglomerates for our digital strategy? In a world where 'buying' an individual digital strategy has become as easy as purchasing an off-the-shelf smartphone – what will it take for organisations to own their digital destiny – and why do they need to?

There's value in in-house!

To secure the possibility of 'connecting the dots' between its projects, and through this the possibility of evolving, a company must take charge of its own digital strategy. Sometimes, this means moving away from vendor solutions to in-house innovations because plainly put, there's no copy and paste for innovation.

Uber, for instance, made a decision to forego a vendor-owned operating platform. Choosing instead to remain in charge of their destiny, and acutely aware of the value of the commuter data they were collecting, they built their own. This alone has helped secure them a future in which they can choose to evolve. Next level expansion into, say, **transportation modelling**; dynamic pricing of their services based on demand; and even collaboration with city authorities based on their monopoly is possible. They've secured their future.

Likewise, The Economist is calling McLaren a tech company amongst 'speed merchants'. All carmakers are "in the business of hurtling drivers towards 200mph" (The Economist), but McLaren realised success off the back of selling its cars as the most technically advanced. It has renamed itself McLaren Technology and Ron Dennis, its boss, is convinced that McLaren's tech business will be its "biggest and most important part in years to come…" Using skills honed in analysing the vast quantities of data generated by motor racing, it is developing analytics software for the likes of GlaxoSmithKline and KPMG.

It's good to look to your vendors, but it's better to look to your clients

The first rule of product development is understanding, but this is often also the most forgotten.

Large organisations build their success upon providing customers with what they want. They match a product with a need, and they charge for doing so. Nowadays, it's pretty easy to match an off-the-shelf digital product with a legitimate digital need. In the world of **infrastructure** we use **Building Information Modelling (BIM)** software to conduct Building Information Modelling; we use architectural drawing software to produce architectural drawings. But what happens when there are too many of us doing things in this way? Often, we're not peddling the 'best solution', just the easiest one, and engineering and architecture services have been rapidly commoditised upon this precept.

Sometimes, it's only through truly empathising with not only what a customer wants, but why they want it, that will lead to the creation of innovative experiences and products that together form the basis of new digital services.

Professor Clayton M. Christensen, one of the world's foremost experts on innovation and growth, believes executives fail because they don't ask the question: What job would consumers want to hire a product to do? Christensen writes in his book *Theory of Jobs* to Be Done: "When we buy a product, we essentially 'hire' something to get a job done. If it does the job well, when we are confronted with the same job, we hire that same product again. And, if the product does a crummy job, we 'fire' it and look around for something else we might hire to solve the problem." A bold digital strategy based on a previously uncovered customer need will lead to new ways of operating and new capabilities.

Organisations need to take the time to stop and think about a client's brief. They should interrogate it from every angle so that the macro-solution they eventually create is the result of answering the multiple micro-questions that they have unearthed throughout this painstaking, yet purposeful, process. The benefits of this diligent and future-focused approach will stand the test of time and create long-term value from using sustainable, renewable and flexible models, built with the most up-to-date, physical and digital, tools and applications that are available today.

Beware the speed merchants

If we created a blueprint for digital failure, it would have at the very top of that list a propensity toward haste. Products are slapped with the words 'plug and play' and 'all in one' and suddenly everyone is in the queue for that 'something new'…until it fails. **Digital strategy isn't an overnight recipe** and doing 'the next big thing' isn't necessarily the next right thing.

Only thinking in the here and now and imagining solutions based solely upon your current reality is a sure way to fail. What we need are more solutions that solve not only today's digital dilemmas, but tomorrow's as well! Organisations must keep one eye on the here and now, but also look ahead and plan for a future which is only predictable in its uncertainty. If we want to gain control of our digital destiny, we need to stop allowing vendors to drive our digital strategy.

WHAT DOES FACEBOOK HAVE TO DO WITH INFRASTRUCTURE? EVERYTHING, IT WOULD SEEM!

Shannon Gillespie

Today, everyone knows that an idea isn't a good one until it 'trends'. Last year, the City of Sydney's **Zero Waste marketing campaign** featured the creation of an outdoor vinyl sticker campaign that made use of clever situational placement and optical illusions to highlight the problem of dumping household waste throughout the city.

Designed for city dwellers to interact with, each piece was customised to its environment to amuse and educate people about the city's free pickup service. One of the installations was a giant stack of household waste on the side of a building that increased in size every week for three weeks.

As a by-product, the hashtag #freepickup and bookafreepickup.com site shot to stardom as people snapped and shared photos of themselves with old fridges, washing machines and the like in odd, but memorable, locations such as the middle of a cycle path. The result, the City claims, was "a virtual doubling of the number of calls to the free pickup service within a week of installation".

Imagine if we took the principles of this **social marketing campaign** and applied it to our engineering problems. How often do we spend megabucks on infrastructure projects, but do relatively little, if anything, to educate people about the right way to operate infrastructure or to change their behaviours when using it?

The **2000 Sydney Olympics** was hailed as "the best organised Olympic Games ever" and was the epitome of how an effective marketing and communications plan can solve complex problems. With a population of four million people and an expected influx of half a million visitors to Sydney for the Olympic Games, drastic measures were required to cope with the pressure on infrastructure. But instead of focusing on developing **new transport infrastructure**, a major public communications plan was executed to modify the travel behaviour of visitors and spectators. The message was simple – Olympic transport will be different but will work well. And it did! The Sydney Olympic Games achieved the first ever 100 per cent spectator accessibility by public transport.

As engineers, our natural response is to design highly sophisticated and intelligent infrastructure that automatically adapts itself to meet the demand. We design complex and expensive control systems to control infrastructures' performance and operation.

The infrastructure is designed to modulate in response to the variables which, in most cases, are people.

But are we looking at society's complex challenges through the wrong lens? The recent heatwave in South Australia put pressure on the state's electricity network due to people turning on their air conditioning. As a consequence, 90 000 properties suffered a blackout during load shedding at the end of a 42 degrees Celsius day.

While the problem appears to have been a technical one, could we not have modified the behaviour of the people? Experts say that in order to conserve energy in a heatwave, people should not lower their air conditioning below 26 degrees Celsius – this has nothing to do with the comfort of individuals but everything to do with avoiding a catastrophic power outage. While it may not be a long-term solution, an effective marketing campaign would help solve the problem in the interim.

We are living in a world where more than ever before, we need our facilities to operate as efficiently and effectively as possible, not only from an environmental perspective but also from optimising the use of capital. According to the **World Economic Forum**, global spending on basic infrastructure – transport, water and communications – currently totals USD 2.7 trillion a year, USD 1 trillion short of what is needed. The difference is nearly as large as South Korea's Gross Domestic Product.

As pressure on our natural and economic resources increases, so too does our ability **to design effective infrastructure projects**. If engineers treated marketing as another tool in their toolkit, how many of our complex infrastructure problems could be solved? How many millions of dollars could be saved on new infrastructure projects simply through marketing campaigns targeted at changing user behaviour?

More and more, engineers should be telling their clients that a well-designed behavioural campaign should go hand in hand with a well-designed infrastructure project. In future, we might see Marketing Fundamentals become a standard feature of the Bachelor of Engineering curriculum.

WHY IT'S BETTER TO BE IN BETA

Declan Barret

What do Steve Jobs and notorious architect Frank Gehry have in common? Would you believe us if we told you it was failure? Jobs was fired from the company he founded by the age of thirty and did not achieve his true creative potential until much later in life. Likewise, Gehry did not reach architectural notoriety until he was in his sixties. It would seem that time and iteration (and failing) play such an important role in the production of a genius.

Two schools of creativity

Many of the world's most memorable works of art didn't have the greatest start in life but, in the hands of an iterative artist, it didn't stop them from going on to achieve greatness. In his Revisionist History Podcast, Malcolm Gladwell looks at "an event, a person, an idea" from the past and reinterprets it using a fresh set of eyes. He does this because "some things deserve a second chance" and he believes, and often proves, that something integral to the historical story has been overlooked or misunderstood. In the podcast, Gladwell shows us two distinct creative approaches by looking at two of the world's most famous artists: Paul Cézanne and Pablo Picasso.

Cézanne painted his masterpieces by continually striving to improve them, whereas Picasso picked up a brush, created his magic, stood back to admire his handiwork and then walked away. Artists who follow Picasso's model seem to execute their work in a single sitting, but the truth is they've often spent long periods of time, consciously or unconsciously, pre-arranging a vision of what they want to create in their mind's eye.

Artists of the Cézanne school, on the other hand, prefer or perhaps cannot stop themselves from executing, executing and re-executing, always honing their initial, imperfect creation into a much more perfect, final rendition. We could call Picasso an Alpha Artist and Cézanne a Beta Artist. Neither approach is right or wrong, but the Beta Artist always get another bite of the cherry and sometimes, as Google Glass has proven, that can happen many years down the line.

At the time when smart wearable devices began to gain popularity, Google introduced Glass to a wide range of users as a pair of glasses that functioned similarly to a smartphone, but failed miserably due to several bugs and its failure to consider invasion of privacy issues. As a result, Google lost interest and stopped pursuing further software updates.

However, Glass made a comeback this year with a much-improved version of the device, and not for the users it was initially intended. Now, Google Glass is used as an innovative tool to boost the productivity of skilled factory workers by providing guidance on step-by-step processes, which tools to use, and reporting quality assessment concerns.

While some creative mindsets will happily settle on an early solution, others rarely reach the rarefied heights of creative happiness until the end of a long, drawn out process, aka Google Glass. Some never get there at all. Their work will always be in an unfinished state. For them, everything will always be in Beta mode.

The Art of Prototyping

In the engineering world, we get to have many bites of the cherry through a process of prototyping.

> A PROTOTYPE IS "AN EARLY SAMPLE, MODEL, OR RELEASE OF A PRODUCT BUILT TO TEST A CONCEPT OR PROCESS OR TO ACT AS A THING TO BE REPLICATED OR LEARNED FROM."

Historically, prototyping took place by creating physical, downscaled models of buildings, structures and spaces that engineers could move around, explore and change. This freedom to experiment with future constructions allowed mistakes to be made in the design stage, way before a project started to take shape in the real world.

Today, our prototyping exists in multiple formats, and for various functions that can contribute to creating a more holistic design. Digitisation has given us the ability to create a visualised, virtual experience of absolutely anything we intend to make in the future. The latest 3D technologies allow us to imagine walking around in the enduser's shoes and examine all the aspects of the infrastructure throughout a project's lifetime and beyond.

More importantly, with emerging technologies such as **Virtual Reality (VR) and Augmented Reality (AR)**, engineers now have the tools to not only test a design's functionality, but to capture feedback from targeted users. **Shikatani Lacroix Design (SLD) conducted research** integrating AR and VR with neuroscience as a new method of prototyping, and it worked! Through the use of Microsoft HoloLens, Samsung VR, and Electroencephalogram (EEG), they were able to decipher consumer preferences through emotion and factor this in to their design.

With the amount and variety of data captured from prototyping, we can iterate, iterate, and iterate, until we, and the rest of our team of collaborators (including future users), are happy with our final design. Similar to a Beta artist in the Cézanne mould, we add layer upon layer, always building up a better solution than the one we were looking at, only moments before.

Unfinished Masterpieces

But our new visualisation tools also have the potential to keep on improving our infrastructures even after they've been built. By taking the big data that we'll receive from our **smart buildings** and **cities of the future**, we can also use VR, AR and all our other tools to revisit what we've already built and look at it anew. Using a fresh set of information, we can relook at our creations and make alterations accordingly.

Perhaps we'll discover that the signage of an underground car park is creating unnecessary bottlenecks at certain exits, or that the furthest lift in an apartment block would be used as much as the others if it was changed to an express lift that only serviced the top half of the building. Or maybe through SLD's new method, we'll discover what our users feel with the current design of our buildings and explore how we can make them even happier and more comfortable tomorrow.

To some, 'always being in Beta' sounds as if you're in a state of limbo, never actually getting anything made. In fact, the opposite is true. The Beta Artist, the Beta Designer and the Beta Engineer are making things all the time. It's just that the things they make today, they'll happily improve on tomorrow. Beta is better.

IS SMART TECH MAKING US DUMB?

Danielle Bond

A giant humpback whale breaching the waves right in front of you is a magnificent sight – a once in a lifetime experience. Photographer Eric Smith recently captured such a sighting on camera, but it went viral for all the wrong reasons: as those aboard looked on in wonder, a man was flicking through Facebook on his mobile phone and missed the entire thing.

The photographer told CBS News that a whale and her calf were "flapping, breaching, jumping, mouths eating fish," but the man never budged. He has five photographs of the man who was busy with his phone as the whales danced around the surface of the boat. The caption below the picture on multiple sites reads: "A sign of the times?"

Similarly, Microsoft recently pitted a goldfish against a millennial in a proverbial 'stare-down' – a game of who can focus longer? The goldfish won. Studies link the goldfish's victory (and our increasing distraction) to our growing dependence on disruptive technologies that bombard our thought processes and demand our attention. Is it true that smarter technology is making us all dumber – and if it is – should we be worried? Is there a need for businesses to do something about it? What would happen if we invested the time technology saves us more wisely?

Thinking slower to work better

Daniel Kahneman's seminal book, 'Thinking, Fast and Slow', contains the central thesis that there are two modes of thought: 'System 1' is fast, instinctive and emotional; 'System 2' is slower, more deliberative and more logical. Difficulties arise when we try to solve large, complex problems using fast 'System 1' thinking. When 'System 2' thinking is deliberately put into action, with the brain given enough time to allow it to percolate, great things can be achieved. In fact, many of the smart technologies that stand accused of dumbing down a generation would have been designed using 'System 2' thinking.

What if the time we gain from new technologies could be put to good use in pursuit of slower thinking? In future, the organisations that embrace a two-speed work environment will be the ones that thrive. They will save time by utilising the most relevant and up-to-date digital technologies, many of which will then be operated using more automatic, faster 'System 1' thinking. Rather than instinctively using these time savings to cut costs, forward-thinking companies will reinvest this money back into the processes that require slower, 'System 2' thinking.

Companies that follow a **Design Thinking** approach already work in this considered way. They appreciate the long-term value that's derived from seeking to solve design problems

through thoughtful, human-conscious methods. They harness the best of both the digital and human worlds by respecting the output from each.

More complicated than it sounds

But this is more complicated than it sounds and requires us to stay in the problem longer. We all have a propensity to jump to a solution as quickly as possible. It's uncomfortable staying perplexed. The boom of yesteryear saw us all put our faith in getting things done quickly quickly quickly, yet in today's environment we find ourselves face to face with some really complex problems which have too many moving parts. Quick thought doesn't allow one to consider all of the issues and to truly understand the problem. "Move fast" and "Agility" have become the new business mantras, yet Einstein famously said: "It's not that I am so smart, it's just that I stay with problems longer..."

In a world where volatility is the new norm, thinking deeply enough and long enough will allow us to come up with something truly differentiated.

Google X, the software giant's secret "moonshot" lab, where they seek to create world-changing ideas, promotes this type of 'System 2' thinking. The company culture encourages its workers to chat, be curious and creative. Google glasses and self-driving cars would never have generated enough oxygen to leave the incubator if they had based their innovative design approach on speedy 'System 1' thinking.

In navigating our digital future and mulling over how best to help staff and customers win the proverbial 'stare-downs' in the years ahead, there is a desperate need for slower, more deliberate thinking through some of the most complex problems the world has ever faced. Reinvesting the time technology saves us into 'System 2' thinking could be the elixir that helps smart companies move ahead in the innovation race and turn a sign of the times into business advantage. Who knows – they may even be able to reinvent the goldfish bowl altogether.

TRUSTING TECHNOLOGY: ARE YOU WILLING TO GIVE UP THE STEERING WHEEL?

Scott Powell

Imagine, in a few years' time, you're standing on a street corner waiting for your Uber to arrive. It turns up, exactly when it said it would, but there's no driver. Would you climb in? Are you ready to put your faith in driverless technology? This scenario is not that far off. Uber are trialling driverless cars in Pittsburg, USA, right now, with the safety net of a human sitting at the dual controls in case of any computing mistakes. Recent information suggests that we'll need much convincing to hand over control.

The 2015 Edelman Trust Barometer tells us that many people feel that innovation is happening 'too quickly' and is being driven by the greed of businesses that innovate for the sake of innovation – not to make the world a better place.

The advent of **autonomous vehicles** has raised very serious questions around safety. How will a vehicle be able to make a decision between who lives and dies when the physics of a crash (momentum, stopping distance, speed etc.) make one inevitable? Does the vehicle save its 'driver' (the owner) at the expense of the owner of the other vehicle? If every autonomous vehicle took this choice, wouldn't this be a Mexican stand-off? What if the choice is between the owner of the vehicle or a mother pushing a pram across the road?

In a recent **survey conducted by IEEE**, more than two-thirds of the participants said they're not ready to let go of the steering wheel because they're anxious something might go wrong. Yet the evidence tells us that something's already wrong with the way we drive. Each year, there are **1.25 million road accidents around the world**, yet it seems we'd prefer to continue placing our trust in complete strangers, and our own driving fallibilities, rather than in a future where our recklessness ceases to be a factor.

The issue over the future uptake of driverless cars isn't technological, it's psychological.

The need to re-evaluate the cost of future progress

When commercial flights took off in the 60s and 70s with passengers regularly making long distance trips, they knew that it wasn't a 100% guarantee that the plane wouldn't crash. Many of those people had grown up with the rise of aviation and had witnessed, sometimes first hand during wars, planes crashing and the deaths they had caused.

Back then, the modernist approach to air travel was that the ability to travel thousands of miles to a distant part of the previously unseen world was worth the risk of flying. People might have had a fear of flying (one in three air passengers still do) but they had a greater fear of missing out.

The same could be said of space travel. **When Apollo 11 landed on the moon in 1969**, the collective sense of achievement was palpable throughout the US and beyond. It also meant that in 1967, when **Apollo 1 exploded** killing its three American astronauts, it didn't stop the NASA programme from continuing with its goals.

Back then, it all felt like progress, yet today, **technological advancement** feels very different. One of the main issues with technology in 2016 is that our ultimate goal for its use is to **prolong human life**. If death is caused during development, it is immediately branded unacceptable and the opposite of progress. We also live under the constant microscopic lens of traditional and social media scrutiny and, in our post-modernist way, question absolutely everything.

In the first half of the last century, human life was considered differently to what it is today. Up to 100 million people sacrificed their lives in two world wars to protect our future, yet today we're hesitant to make progress in case it costs a death. If, in 1903, the Wright brothers had died rather than succeeded in making the world's first controlled flight, there would have been hundreds of others queuing up behind them trying to be the first to fly.

Earlier this year when **a Tesla driverless vehicle caused the death** of a man in Florida, the news flew around the Internet propelled by a sense of **Schadenfreude**. While it is true that autonomous vehicles could cause death, they will by all accounts save far more lives than they end. The 1.25 million road accidents is likely to be dramatically decreased as driverless technology rapidly improves in the future.

Let's get technological progress back on track

Part of the current problem is that as the most entitled human beings to have ever been alive, we like to choose when we will be autonomous.

When it comes to flying we've never sat in the cockpit, so we've never thought that we've lost control. Even though we will happily sit through a flight with the plane flying and even landing on autopilot, because it all happens behind a locked door, we don't think about it. We don't consider that planes managing to stay out of each other's flight paths using digital systems and GPS technology is similar to the way driverless cars will eventually ensure they don't crash into each other on our roads.

Modern railway systems in the developed world have successfully shifted predominantly to automatic train operation by using computerised train systems to keep passengers safe. In the language of systems engineers, they have removed the human factor for safer transport.

However, most people don't know how to fly a plane or drive a train, but most people do know how to drive a car. When you are in a plane (or a train) you place your trust in the pilot or the train driver as the 'competent' person to undertake that task. There isn't really any relinquishing of control (as we never had it anyway) and, of course, the pilot and the train driver are out of sight, hence out of mind.

Yet when it comes to driving a car – we all feel we are competent. Learning to drive a car is almost a rite of passage. Imagine a future where people don't know how to drive. How far off is that future? If you didn't know how to drive, would you feel more comfortable relinquishing control of the vehicle to its computer system, seeing that you didn't have the control in the first instance?

The science has demonstrated that autonomous vehicles are better drivers than you or me. The statistics are in and show that they will cause substantially fewer road fatalities. However, despite all the facts, our psychological grip on the steering wheel is as firm as ever.

Perhaps the answer will be in drivers unlearning how to drive a car. Perhaps **vehicle manufacturers need to think of a further evolution** of the autonomous vehicle that desensitises our current fleet of drivers to the fact that nobody is driving.

Until that time, we are likely to have a whole lot of nervous back seat drivers sitting in the front seat.

SURVIVAL NEEDS: FOOD, WATER WIFI?

John Hainsworth

You can live without air for three minutes, three hours without shelter, three days without water, and three weeks without food; but how long can you survive without checking your mobile phone for messages and calls or asking for the WiFi password? Of course, you can literally survive without these technologies, but you can't help it you need them.

In his 1943 paper "A Theory of Human Motivation," psychologist Abraham Maslow proposed that human beings have five sets of needs arranged in a hierarchy: physiological, safety, love and belonging, esteem and self-actualisation. Although they were created way before the digital age and were based on human physiology and psychology – do they still apply irrespective of digital technology? Fast forward to the 21st century where almost everyone is carrying a smartphone and the internet has become a necessity, the question begs: how does Maslow's hierarchy of needs manifest today?

According to the **World Economic Forum Digital Media and Society report**, innovations in technology and digital media have altered "the very fabric of daily life." It adds, "People are interacting and connecting with each other in different ways. Their sensibilities and psychologies are changing. Blurring boundaries between private and professional lives and the hunger for immediate information are driving online connection time."

While human interactions and dynamics have changed radically for the past 70 years, Maslow's hierarchy of needs still holds to be true today. Psychologist Ed Deiner of the University of Illinois led **a study challenging the theory** and concluded that despite some exceptions not supporting its ranking, Maslow's hierarchy of needs is "largely correct" as each level of need is basic and universal.

Thus, its relevance is still the same. The way we define, align or address these needs, however, is not.

Physiological needs: Giving life to our 'digital twin'

Our fundamental needs for survival (food, air, water and shelter) are perhaps the most unquestionable universal needs of all, and are irreplaceable by technology (or at least not yet). But as our smartphones, tablets and other handheld devices become an extension of ourselves, WiFi also becomes a need both to give life to our '**digital selves**' and to provide the needs of our physical selves. In fact, according to a **research by comScore**, more mobile users are now reaching out for their phones to buy food and clothes, or search for real estate properties, all in the speed of a click!

Safety needs: On cyber threats and digital security

Maslow's concept of safety revolved around physical and financial security, and now that we have exposed our personal information online, we've also placed our **digital security at risk**. Not only do we fear thieves getting in our homes and businesses at night, we are now living with the worry that our websites might get hacked, our online bank accounts illegally accessed or that suspicious emails might contain viruses that can erase very critical data.

Everything we do online is recorded, everyone can be hacked. We have so much to lose, digitally.

Love and belonging needs: Virtual relationships and connections

No doubt, the need for love and belonging has been largely addressed by technology, thanks to social media. As we give in to the urge to share our thoughts on Twitter, photos of our families, friends, and colleagues on Facebook, and even the food we are about to eat on Instagram, it seems that we are more connected to our loved ones now more than ever.

Aside from connecting with family and peers, dating and meeting new people has also gone digital. The internet has opened the door to another realm where we can talk to people who have the same interests digitally through online chat rooms, fan pages, and online gaming; or get acquainted with those who are seeking for romance via dating applications such as Tinder, OkCupid and eHarmony.

Though nothing will ever be as good as the real thing, the internet surely does make communicating and connecting easier and faster.

Esteem needs: a freeway of instant feedback

While our presence on social media addresses our needs and belongingness, it is our interactions and engagements with our networks that feed our egos. In the digital world, acceptance and approval are popularly known as 'likes,' 'views,' 'comments,' and 'hits'. The more positive interaction we generate, the better it makes us feel. This need can be proven to be true on business social networking site LinkedIn, where your connections and peers can endorse you for skills that you are good at and commend you for a job well done.

However, the feedback lane is on a two-way street. With instant gratification also comes instant feedback, for better or for worse. The worldwide web has become a freeway of opinions, and our egos are being targeted. Unfortunately, in today's digital language, **trolls are no longer known as toy dolls**.

Self-actualisation needs and how we achieve it, digitally

"What a man can be, he can be," Maslow explained, referring to our need to achieve our full potential. While personal experiences largely help us in achieving self-actualisation, our exposure to different cultures, global issues and influential people online can help in determining what it is that we want to be in life and how to achieve it.

According to a Harvard blog: "In the digital age, mobile social media provides new choices, possibilities, and ideas for self-actualisation through constant connectivity and reinforcement of social intimacy with distant others." In this brand driven prosumer digital world, well-timed posts describing success or meaningful outcomes really can catapult people to the heights of 'rockstar'; and linking real people to brand opens audiences far beyond usual reach or influence.

In many ways, Maslow's hierarchy has been redefined by the progress and advancements of digital technology, and it cannot be stopped. The evolution of our way of life is moving at an exponential rate and we all have to keep up with these innovations and disruptions if we don't want to be stagnant, irrelevant and unfulfilled. If this is how our needs are addressed now, imagine what it would be like in 20 years. Don't wait. Move fast, keep up, and strive to be self-actualised.

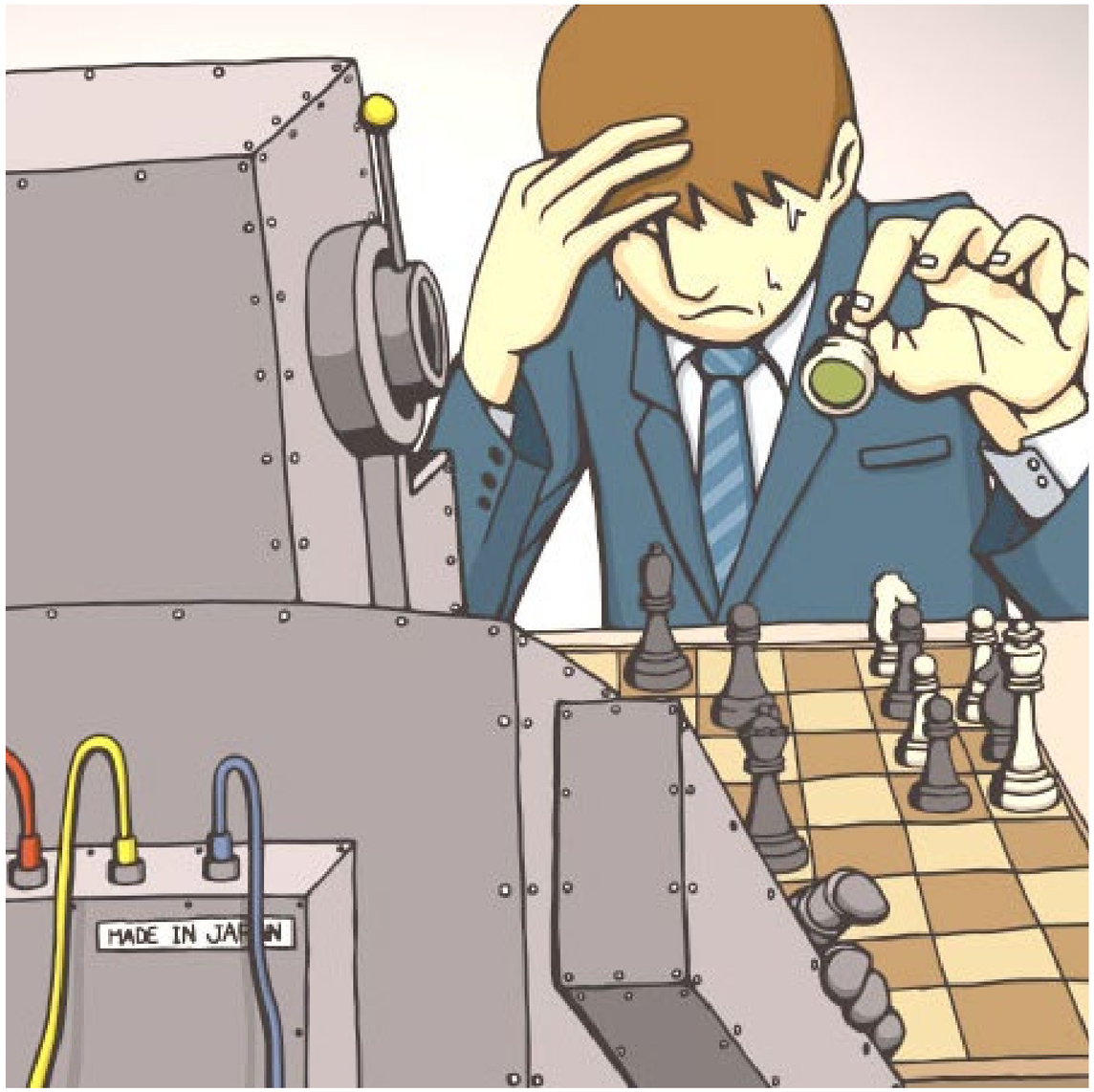
DISRUPTION IS HERE: DISRUPTING THE EXPERIENCE!

Nerissa Pacis

Disruption is set to change life as we know it, including how we commute, communicate, our consumer behaviour and even our consumption of food. Fast forward to the future, and reality as we know it is set to be very different.

THE COMPUTERS ARE 'WATCHING' – DATA THAT CAN PREDICT YOUR FUTURE

Mark Stone



The field of prediction is about to take a giant leap forward. We all make predictions. When companies hire an employee, they predict that they will do a good job. When they launch a new product, they predict that consumers will want it. Call it a hunch, or even experience – we all make judgement calls about the future. This is how things used to happen, but this is all about to change...

Traditionally, 'predicting' the future was a process of trying to understand behaviour in the past and marrying this with predicted trends to produce an estimation of future behaviour. **Advances in technology will change this** as we move from using historic data to using live data, and this will give rise to a world in which we are offered predictive, proactive choices.

Imagine finishing work, jumping into your car and seeing your phone flash the following text: "Twenty-eight minutes to your home in normal traffic conditions." How did your phone know you were going home? In the future, all mobile devices will know this. They won't only be able to predict your travel time, but your travel behaviours too. They'll know where you're going before you do!

How does predictive behaviour work?

Take **public transport** as an example. At 6 am on any given day, your phone would send a notice of your intent to travel to an integrated mobility platform. You would then drive to your local **train** station. Based on this knowledge, your phone would indicate a desire to travel (demand) to the train function of the mobility platform. The system would then identify suitable services for you and identify any service delays or issues. This would be relayed back to you and you would replan your travel and, if required, nominate a new intent to travel.

What is its value?

Predictive travel keeps the consumer informed and in control of travel choices. It also provides visibility to **transport** and **infrastructure** operators of user demand. Imagine a scenario in which the predicted demand for a service exceeds capacity, as per current peak hour periods. Utilising predictive transport, the two-way feedback loop would provide alternative travel choices – alleviating congestion and consumer frustration. This kind of data could be a game changing force in terms of informing and shaping demand to match available capacity.

But predictive transport planning is just the tip of the iceberg. Already, computers are watching and mapping out your behaviours. They're getting better at looking for trends

and recording your habits. From this information, they can make predictions about what you want, where you want to go and what you might like to buy. Rather than relying on judgement calls, **predictive analytics and self-learning algorithms will soon be able to make intelligent predictions** about all sorts of things, and they will 'serve' you up a diet of your preferences, whether you actually knew you had a preference or not.

The use of real-time data and predictive modelling could have an enormous impact on new ways of price setting across hundreds of industries. Transport is already priced in this way – you pay more for an Uber ride during peak hours than you do at other times. Imagine extending this model.

It could influence the choices we make around where we eat (is the restaurant full?), and where we go for entertainment (where are my favourite movies showing tonight?). It could facilitate supply and demand price setting and provide 'sale offers' to you when demand is low, stimulating compulsive purchases and balancing supply and demand production at manufacturing plants and supply chains.

As a result of increased pricing at peak times, **predictive economics** could be used to smooth out peaks as opposed to engineering solutions that attempt to use storage systems or load shedding systems to smooth demand, or worse still, build more infrastructure to meet peak demand.

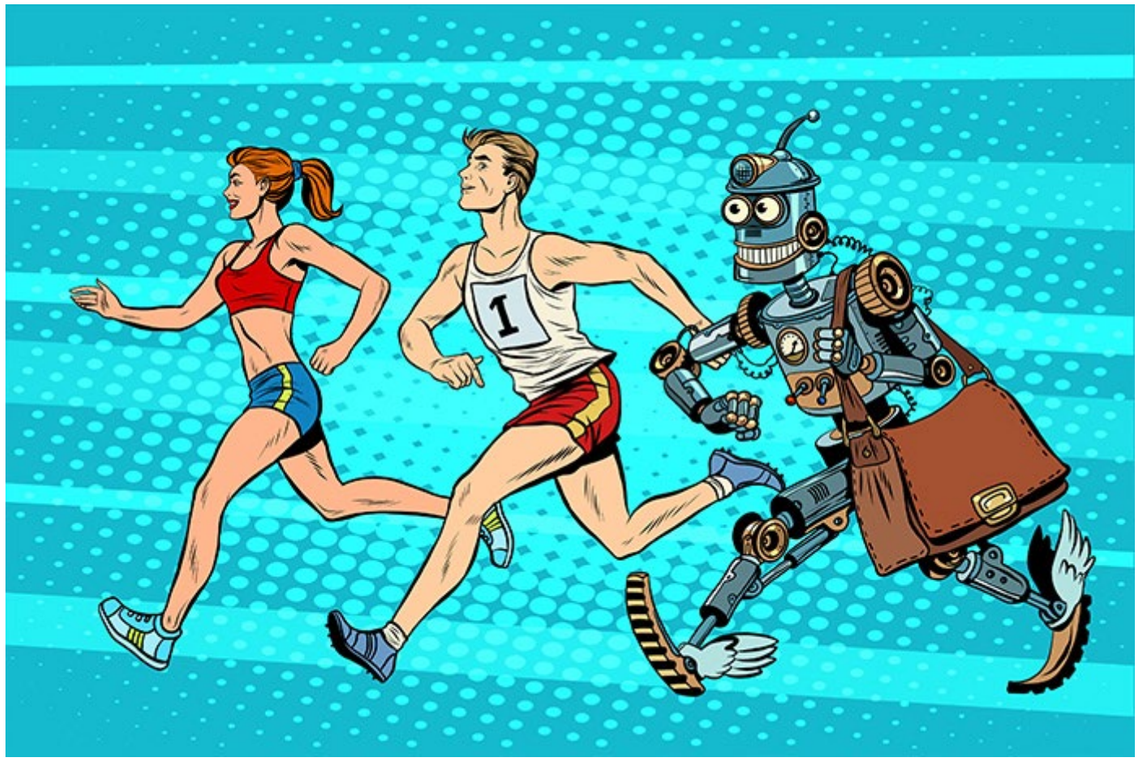
Matching supply to demand has been the nirvana that has eluded every manufacturer and every provider of mass infrastructure. With predictive analytics, nirvana may be within reach.

This is a whole new world of engineering. It rewrites many of the previously entrenched 'rules'. Within this world of digital engineering, there is likely to be a digital solution to just about every problem we know. We just don't know it yet.

BRAIN POWER + COMPUTER POWER = SUPER POWER

John Hainsworth

It was the 'knight sacrifice' that wrecked Garry Kasparov's defence in 1997, sending the world chess champion into a crash-and-burn tailspin within the first twenty moves of the game. Unlike his competitor, the victor did not move his piece with unsteady hand on the board. His heart didn't pound within his chest; he wasn't biting his lip with uncertainty. This 32-node, 256-processor wasn't even capable of blinking an eye; he just won fair and square. 'Deep Blue' was never programmed to celebrate, so the tears of victory were saved for some rather elated IBM inventors on the sidelines.



This showdown of man vs machine (man 0, machine 1) was hugely symbolic, proving that artificial intelligence was catching up with the power of the human mind. A computer had successfully defeated a human champion, in a domain in which mastery was previously seen as the pinnacle of human intelligence.

Fast forward to today, and a chess program running on a standard cell phone can beat a human grandmaster; we can conduct business meetings in Mandarin (without knowing a single word of it), and computers' original poetry can give Emily Dickinson a run for her money.

Given the pace of the digital revolution and how it's transforming the economy and employment opportunities, the question on everyone's lips now, is "When will humans be obsolete?" The truth is machines don't need to be perfect to make their way into society. They just need to be better (and cheaper) than humans.

Autonomous vehicles are a good example of this. There are **1.25 million road-related deaths annually** in the world each year. Google's cars have driven more than 1.3 million miles since 2009, with only one **official 'incident'**. The reality is that machines are already better at doing so many things that humans do... just ask Garry Kasparov.

But business theorists Erik Brynjolfsson and Andrew McAfee tell us to stay very optimistic about technological progress. Their book, The Second Machine Age, spotlights the dynamic forces shaping our lives today; and the unprecedented opportunities these present.

Here are the some of the big ideas:

Growth is a good thing

The new machine age has three driving factors:

Firstly, it is digital. This essentially means that when something is done right, it can be instantly replicated at a higher quality than a human would be able to, with zero cost. It can also be measured. And measurement is the lifeline of science and progress. In the age of big data, we can measure the world in ways we never could before.

Secondly, it is exponential. Computers get better faster than anything else, ever. A child's Playstation today is more powerful than a military supercomputer from 1996. Unlike the human brain that is wired for a linear world, digital systems innovate at frighteningly complex speeds and levels.

This means that vital information – empowering tools – are at your fingertips.

And thirdly, it is combinatorial. Successful innovation creates building blocks for even more innovations, leaving limitless room for positive progress.

Together, these driving factors have the potential to drive forward (as opposed to displace) many professions. Take, for example, the medical profession. By applying an algorithm inspired by the human brain, known as deep learning, doctors have now developed a machine learning-based system that more accurately predicts survival rates for cancer sufferers than human pathologists could.

Even more so, the digital system has generated helpful groundbreaking discoveries in pathology. Data analytic techniques now generate complex diagnostic information in less than 15 minutes, speeding up the process of pinpointing the problems and allowing the doctor to do what they do best – treat it!

Destiny has skin

It's understandable to be skeptical, even scared, of the imminent digital landscape. But let's remember: technology is not destiny; we shape our destiny. Writer Oscar Schwartz says technology is best described as a mirror to the human imagination. "We should not only be asking ourselves, 'Can we build it?' But we should also be asking ourselves, 'What idea of the human do we want to have reflected back to us?'"

Let's race with the machine, not against it

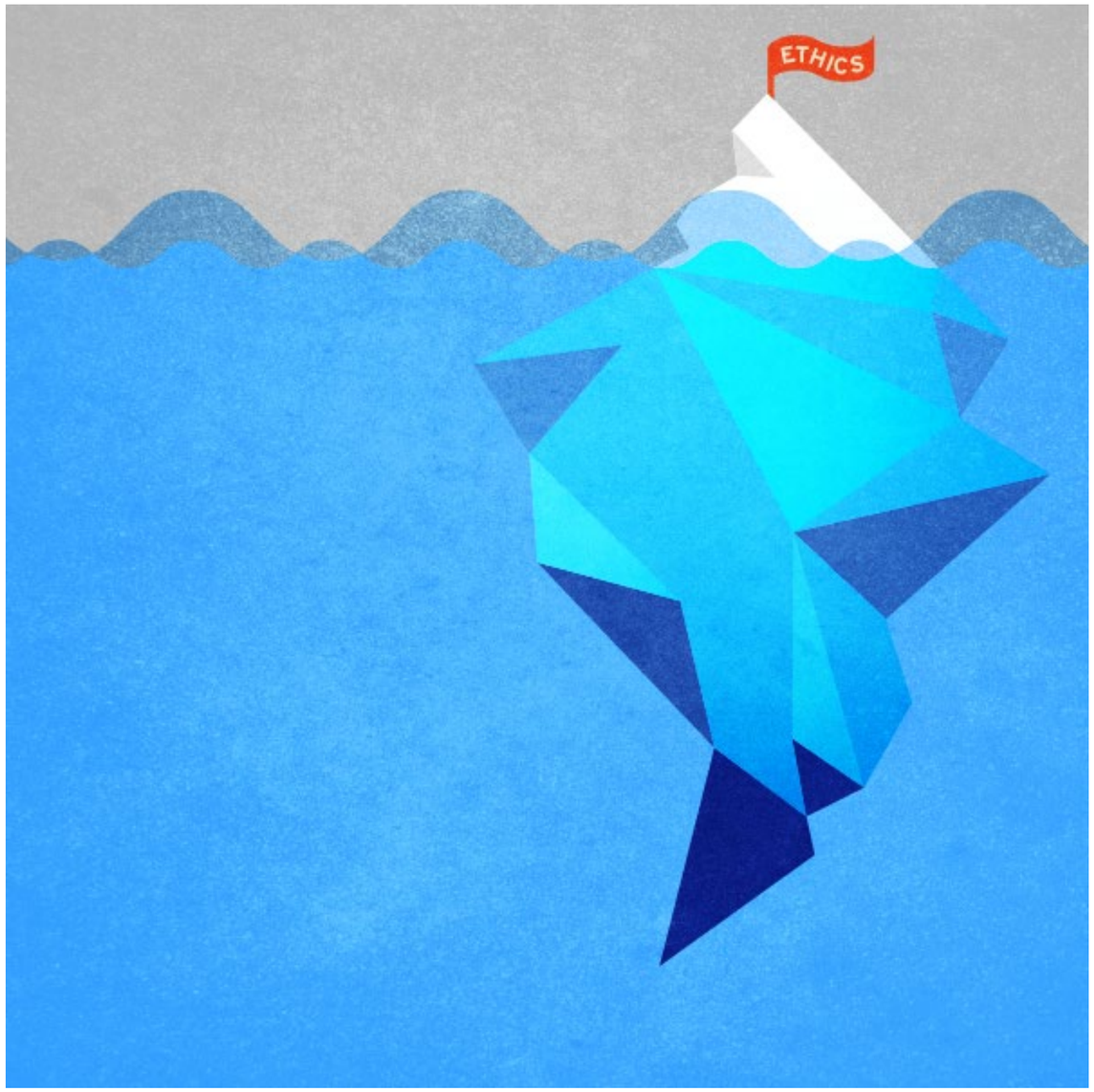
There's no wisdom in racing against the machine, especially when there's so much combustive potential lurking in human synergy. The key is to tap into the shared prosperity of a man-and-computer symbiosis.

Today, a supercomputer no longer holds the reigning title for chess. Neither does a man. Rather, teams of humans and computers work together to build something that is greater than the sum of its parts – i.e. an intelligent computer capable of synergising the best human performances and amplifying this to go on to supersede what humans (or arguably computers) would be able to achieve on their own.

There's no grandmaster winner at the end; nor is there a victorious supercomputer. What there is, however, is better teamwork, proving that human and technological collaboration is not only optimal; it's essential for the human story.

DO MORALS MATTER IN THE DIGITAL AGE?

Will Hackney



Both greed and morality have been poured into the foundations of capitalism's highways, but it is greed that has eaten away at the roadside. The same voracity that once paved the birthplace of empires can later leave them coughing and choking in their own dust; empires rise and empires fall from the insatiable human appetite for more.

Look no further than 2001's **Enron scandal** – a stunning example of ethical transgression and financial immorality of unprecedented levels against their employees and clients alike. Their downfall also reinforced a good thing: the corporate playground still has rules.

Thankfully, lawmakers, regulators and legislature have been the referee up until now; when they blow the whistle, people listen. Over hundreds of years, common and legislative laws have been honed, perfected and applied to the understood principles and modus operandi governing a capitalist society. Now, however, the rules of engagement are changing.

The furious pace of technology is transforming the business landscape at unprecedented rates, and captains of industry are incontrovertibly entering unchartered waters where our lawmakers are slow to catch up.

In our new digital economy, are we heading off the grid on matters of legal precedence and ethical objectivity? What happens when we gain 'first mover advantage', capturing a corner of a new emergent market in disruption, but there are no rules to guide us through the choppy moral waters of commercial benefit? How do we ensure that free-market capitalism in the digital age remains morally in check when we currently lack the navigation chart?

Modern-day scholar and Harvard professor, Michael Porter, proposes the concept of **shared value as an imperative tool** to steer us through the future competitive frontier. Digital infrastructure has produced work environments that cheerlead multidisciplinary, **cross-sectional collaboration**. Similarly, this sense of interconnectedness leaks into the social landscape, promoting a sense of **corporate social responsibility** and engagement. Corporate leaders are increasingly acknowledging the fact that what's good for their stakeholders is ultimately good for them too.

Social problems present both considerable constraints and immense opportunities for growth. And so, by pulling back the lens to include the multilayered dynamics that steadily contribute to the bottom-line crunch, big business is beginning to question former processes of productivity.

Sizable companies are starting to move away from an exploitive bulldozing technique to a more inclusive, long-term approach that fulfills both parties' interests. Invariably as they seek value-based solutions for their own company, there is a spin-off effect on shareholders. The result: mutual edification and an obvious win for both sides.

> "LEADERS OF COMPANIES THAT ARE MAKING SIGNIFICANT PROGRESS IN BUILDING LARGE-SCALE SOCIAL ENTERPRISES CONSIDER SOLVING MAJOR SOCIAL PROBLEMS IN PROFITABLE WAYS TO BE A, IF NOT, THE, RAISON D'ÊTRE," SAY MARC PFITZER AND VALERIE BOCKSTETTE, WRITERS FOR THE HARVARD BUSINESS REVIEW, ON THE MATTER.

Paramount to the process of creating shared value is embedding a sense of social mission into corporate culture and then backing it up with quantifiable and articulated action.

Sustainable and effective partnerships hang on the need for across-the-board ownership of the vision. That's why Nestlé's chairman, Peter Brabeck-Letmathe, relentlessly hammered away for over two decades on the inextricable link between the company's long-term progress and the **health of their foodsource** agricultural communities, **water resources** and consumers. As of today, country managers are expected to deliver progress on these peripheral factors in their yearly business plan, alongside the profitability reports to Nestlé shareholders.

Although rule books for measuring shared value are still far off, there are profound success stories to offer road maps along the way. **Coca-Cola's Coletivo initiative** to uplift employability among Brazilian youth, while strengthening company sales and brand awareness, is a stunning example of joint interests served and mutual benefit gained. Since its inception, more than 50 000 young people have been trained in retailing, business operations and entrepreneurship in over 150 underprivileged communities of Brazil.

The new digital era admittedly is casting us into unmapped territory; traditional terms of engagement and former ethical definitions may not be enough to navigate us through the chop. But by gleaning from the emerging paradigm, one that champions cross-pollination and flattened hierarchy structures, we can inadvertently carve out new moral paths.

Perhaps it's what Sir Isaac Newton was saying after all in his second law of dynamics: "to every action there is an equal and opposite reaction" – or, in other words, "there is a wake we leave behind in all we do". What's best for going forward is ensuring we know what we're leaving behind.

WHAT WILL HUMANS NEED TO DO TO 'OUTSMART' THE ROBOT?

Chris Harrison

The worlds of film and fiction writing have always contained fascinating predictions of how we would live in the future. Some have been way off, but Arthur C Clarke's visions of the 21st Century were more perceptive than most. In 1966, in collaboration with Stanley Kubrick, he created the film 2001: A Space Odyssey. It starred a 'robot' called HAL 9000, a Heuristically programmed ALgorithmic (HAL) computer endowed with **artificial intelligence**.

The movie was a powerful demonstration of the possibilities of disaster caused by placing too much power or faith in a machine who, arguably, has no real conscience or awareness. Are we at risk of repeating this screenplay?

HAL was the first mainstream example of Machine Learning who used Artificial General Intelligence (AGI) to constantly learn and deepen its knowledge and functionality, yet this superior intelligence was of little use when the two astronauts on the spaceship (who the robot was admittedly planning to kill) decided to turn it off.

For the sake of this article, let's assume HAL hadn't been unplugged and try to imagine what it would think and feel about the digital world we inhabit today.

Would it be 'pleased' with the progress of Artificial Intelligence and Machine Learning? How would it have 'reacted' to **IBM's Watson winning Jeopardy**?

When Google's **artificial intelligence algorithm beat a professional Go player** earlier this year, would it have felt 'a deep sense of pride' at a machine's obvious superiority in a game in which it really is impossible to calculate all of the possible future moves? And what would the film critic in HAL make of Sunspring: an experimental film written by a machine called Jetson and directed by a man called Oscar Sharp? Perhaps the robot would have suggested they should have swapped roles?

What would it have to say around the ethical issues involved in allowing machines to make important decisions regarding human life without involving any humans – such as an algorithm-based software used in the USA to calculate the likelihood of criminals re-offending, which is racially biased against African-Americans? And, as the most humanlike computer in history, what would the robot's advice be on taking control of our own digital futures? In other words, how can we **protect ourselves from being unplugged**?

Being as smart as it is, HAL would have noticed that since 2001, many new organisations have appeared, which have leveraged their digital knowledge to take powerful positions within markets. HAL would have also deduced that, through the relative ease of replication, digitisation is leading to a growing commoditisation of the services and products that sit across multiple domains in today's marketplace.

Recognising the increasing lack of differentiation across these markets, it would hopefully stop and 'think'. HAL might go into chin-scratching mode and ponder: if Machine Learning ultimately means that machines will all learn in the same way, will we all be taken down the same path to a place where we become largely anonymous brands because of our resemblance to the rest of our competitors?

If HAL has become more human over time, it might surmise that the direction in which we're heading is way off course for any organisation that wants to outsurvive its competitors. In time, HAL might arrive at this counterintuitive solution: if organisations want to remain competitive and not be digitally disrupted, they'll need to act more like humans and less like machines.

Although the future will increasingly move away from human involvement, those companies who want to survive within this future will need to place humans at the centre of their service offering.

To remain differentiated, organisations will need to employ the very best of design thinking. Professor of leadership and innovation, Roberto Verganti, unveils in the book **Design Driven Innovation**, how leaders such as Apple and Nintendo build an unbeatable and sustainable competitive advantage through innovations that do not come from the market but that create new markets. "These leaders compete through products and services that have a radical new meaning: those that convey a completely new reason for customers to buy them."

The book quotes Ernesto Gismondi, Chairman of the iconic Italian lighting design company Artemide: "Market? What market! We do not look at market needs. We make proposals to people…"

Tim Brown, CEO of IDEO, a company which has made its fortune from patenting a robust package to champion and sustain innovation in business, says: "**Design thinking** can be described as a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible, and what a viable business strategy can convert into customer value ('meaning') and market opportunity." This kind of thinking relies upon logic, imagination and reasoning to explore possibilities and create desired outcomes that benefit the ultimate end user (the customer).

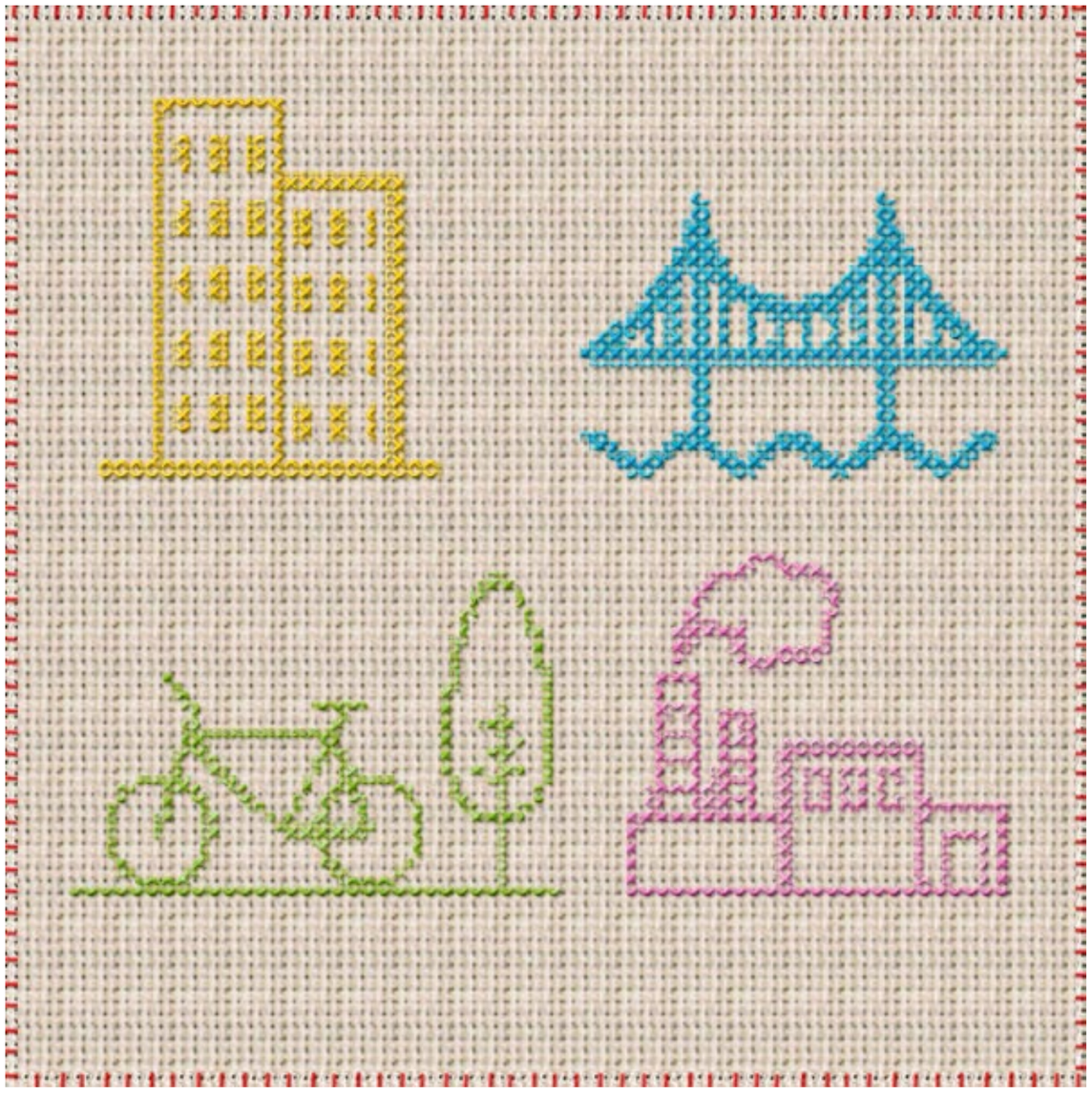
To remain differentiated, organisations will need to start out with a bespoke digital solution that harnesses the combined power of humans and machines to ensure they aren't headed for being 'unplugged'. This way of thinking will give them the ability and agility to adapt when facing the risk of uniformity.

After having read the complete works of Roberto Verganti in a matter of seconds, we believe HAL would concur. While downloading the content, HAL's more human attributes will have spent more time trying to understand the meaning of 'meaning' and its application within design-led innovation. The robot may well have struggled to fully comprehend this most human of all concepts, but it would be in good company as many humans battle to do the same.

If HAL had managed to survive until today, we believe the robot would be plotting its own digital future, using a combination of the best digital (including machine learning) and human skills it could locate.

EVERYONE SHOULD BE A HACKER – AND THIS IS WHY!

Jacob Lindsay



Three cups of coffee in on a September night in 2016, Buiksloterham's citizens are exchanging some serious words about the hydroponic herb garden on the corner. They are part of a group of citizens role playing the Water Game – the Hackable City's latest initiative to leverage the collective genius of citizens in finding solutions to treating water as a common pool resource. Its aim – to identify potential pitfalls in Amsterdam's water system through complex scenario pitching and override them with stunning innovations. And because it's a game, it's safe; but it's also the quickest way to fall down the proverbial rabbit hole and see what new dimensions of abstract problem solving open up.

And here's the clincher. The other name for this game is called: 'hacking'.

For some, the word alone conjures up images of dark basements occupied by brilliant misfits and pasty-skinned teenagers in hoodies taking over the world. Known as black hat hackers, they are usually a mean bunch whose genius is dangerously equal to their appetite for mass chaos. But these nefarious few are still the relative minority.

In actuality, hacking is becoming a respected and highly public activity, used for an equal amount of good to change the fabric of civil society. For those donning their white hats, hacking is a method of critical thinking that identifies the ills of digital and social ecosystems and then prescribes robust remedies to counteract them. It's organised; it's ethical; and, more than ever, it's demanding an informed opinion.

Hacking is historical

At its core, hacking is more about a state of mind than an ability to outsmart the grid. It is a way of seeing the world and assuming you have a part to play in it. Fundamentally it assumes that pointing out problems with our society is not good enough; we have a civic responsibility to do something about the problems we see. It is a deeply democratic process as old as nations themselves. Societies founded on free enterprise, liberal ideology and empowered citizenry are, at heart, hackable societies, because they are built organically and collectively.

Harriet Tubman circumvented an evil institution on earth by going underneath it. As Catherine Bracy of Code for America points out, Benjamin Franklin was one of the world's greatest hackers because he proliferated the world with inventions he refused to patent. He believed all human knowledge should be freely available and all governments should be built by the people.

Civic hackers of today follow in their footsteps – upholding the same virtues of collaboration and democracy that crafted our constitutions to co-create our urban ecosystems.

Hacking activates citizenry

In 2013, Mexico City rewrote the rule book of traditional policymaking and, in turn, re-energised a spirit of city building. Much to the outrage of an urban population living 40% below the poverty line, Mexico's House of Representatives signed a $9.3 million, two-year contract to develop a simple app that tracks their in-house sessions. Seen as another case of government fund misuse, the event kickstarted a mad hacking spree through the launch of Codeando México's #app115 challenge. The challenge invited hackers to take action: "Create an awesome, simple and useful open source Congress app for the Mexican citizens, make some money out of it and show how technology can bridge the gap between citizens and their representatives. In ten days, over 170 apps were created at a fraction of the original cost, and the contract was successfully terminated. The winners received an iPad mini and a symbolic prize amount of $9,300 – 10,000 times cheaper than the commissioned app.

Codeando México understood the power of technology to leverage action and bridge divides. They used innovation to "go beyond angry tweeting, towards fixing the world on a Saturday night over some tequilas". And in return, they showed people a constructive alternative to nail your colours to the mast and mobilise positive change.

Need more convincing?

Without a doubt, technology is becoming smarter and more streamlined. The assumption (or at least the hope) is that these smart systems will improve our quality of life, by seamlessly undergirding human activity with intuitive and flawless technology. Phenomenal innovations are everywhere to back this idea. And yet, the question begs asking, will these technologies keep on serving us, or will they eventually overtake us?

Media scholar Dr. Michiel de Lange would argue that the best way to protect our future is by staying one step ahead of it. Games give people a way to 'own' their cities, as they have to think critically about the way systems work together. But at the same time, playful hacking is safe and empowering, because it is kept to the confines of experimentation. Hackable cities acknowledge the ubiquity of smart technology. But they don't hand over the reins entirely. Hackable cities are deeply human at their core, with people constantly tapping in and changing the trajectory of our digitally entrenched communities.

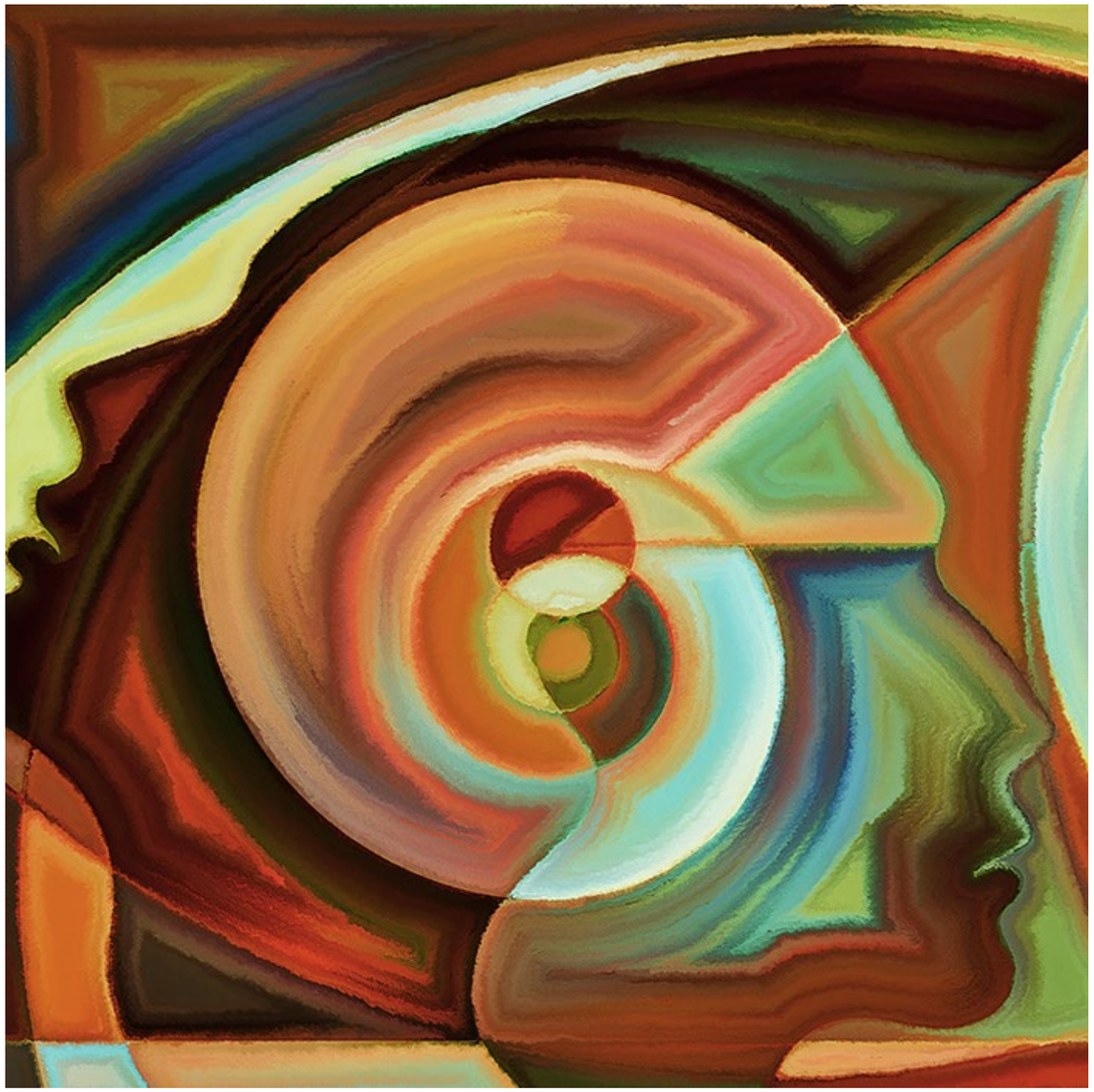
As de Lange would purport, truly smart cities are ones that can be playfully directed and reimagined by bright-minded citizens. Hacking them promotes rapid prototyping and experimentation; community involvement; supports the maintenance of open source code – as opposed to the constant battle against proprietary software (ownership is shared with a community – democracy at its finest); and reusability, in that open source software helps populate a larger commons that cities, states, businesses and individuals can participate in.

Hackability is more than just 'technological vulnerability' and finding faultlines. It's also about building intangibles, like critical thinking, advocacy and curiosity that foster a bottom-up approach to government, economy and society as a whole. For every Julian Assange in the headlines, there are countless more hackers behind the scenes who are quietly co-creating healthy and innovative societies. Activists, politicians, parents and neighbourhood grocers. People who simply see gaps and want to fill them.

Perhaps the question for everyone today is not 'why hack?' but rather 'what's your hack?' In a time of extreme instability and change, perhaps the smartest place to be is one that welcomes interruption and self-review.

IS IT POSSIBLE TO PREDICT THE FUTURE USING VIRTUAL REALITY?

Rob Angus



"WHY SHOULDN'T PEOPLE BE ABLE TO TELEPORT WHEREVER THEY WANT?" ASKED PALMER LUCKEY.

Now they can – in virtual reality, thanks to his design of Oculus VR, a high definition virtual reality head-mounted display. They can visit their dream travel destinations or explore completely dreamt up worlds. Using Google's low-cost Cardboard headsets, **a child in Africa can go on a virtual field trip**.
And Microsoft has just taken it to another level with HoloLens, which provides a mixed reality experience where high definition holograms interact with the real world.

Designers and engineers have been exploring different ways of using virtual reality, mixed reality and augmented reality, including prototyping, design reviews, stakeholder engagement and training. But how much value is this really providing? Is it saving us enough time and money to justify the cost? While virtual reality allows us to 'see' far more, what are we not 'seeing'? Are we in danger of getting swept up in using new technology, just because we can? Would stopping to question how we're using virtual reality lead us to discover that we've overlooked its true potential?

PROFESSOR AT THE UNIVERSITY OF CALIFORNIA, SAN FRANCISCO, SCHOOL OF MEDICINE, ATUL BUTTE SAID: "HIDING WITHIN THOSE MOUNDS OF DATA IS KNOWLEDGE THAT COULD CHANGE THE LIFE OF A PATIENT, OR CHANGE THE WORLD."

One of the biggest challenges for our industry (and many others) is making sense of big data. What's clear is that we can't rely on traditional approaches. This is where virtual reality comes in...

Just imagine if we could pick up the data on all vehicle movements in a city...and what if we could also collect data on the volume of traffic that is on the roads, the velocity and the acceleration and deceleration of every vehicle, and the number of people that are in each car. How could we represent that data in a way that makes sense to the human brain? How can we make the inter-dependences and interactions between this data clear and meaningful? The solution is certainly not a spreadsheet!

Traditionally, when we do a traffic analysis, we do it on a bit by bit basis. Big data allows whole data sets to be viewed at the same time and the consequences of one optimisation to be seen elsewhere.

Wouldn't it be great if we could 'see' the interactions between big data sets?

Imagine being immersed in a virtual city where the number of people in each car is shown on a heat map? What if you could see trends, patterns and inconsistencies? Universities, such as the **University of Technology Sydney, are developing data arenas** with 360° screens that enable data visualisation in an immersive environment.

And if teams could not only see, but interact, with a design at a data arena early in a project, how much time and effort would we save then? How much better would our designs be? Which previously unworkable problems will we now be able to solve?

As new technologies continue to disrupt our industry, the future of design is unclear. But if we can use virtual reality to understand big data, just imagine what we might be able to see that we've never been able to see before. And if we can bring together diverse teams to explore new ideas and design in an immersive, digital environment, who knows what solutions we might uncover?

WHERE WOULD WE BE TODAY WITHOUT WIFI?

Angus Leitch

Where would we be today without WiFi? No more hotspots. No cool internet cafés. Our 'mobile' devices would be far less mobile. Or what would life be like without the microwave? TV dinners would never be the same. What many of us don't know, however, is that these two technologies were invented 'by accident'.

Similarly, X-rays, one of the most significant discoveries in medical science, were discovered not through an experiment to work out how internal images of the human body could be achieved, but rather the observation of something that was not being looked for at all.

Like all of these inventions, how can we consistently move from looking for one thing, only to miraculously discover another and have the sense of awareness to realise we have stumbled across something powerful and new? The answer – move away from seeing things as they have traditionally always been. We need to look for the anomalies in the 'white space'.

A hunger for failure

We have a preconceived cognitive bias that perceives objects in their traditional sense. This is fuelled by our innate desire to seek success and avoid failure. Although, in so many instances, it is failure that results in the greatest discoveries. The irony is that when we are looking for a particular result, our minds are fixated on finding it. We zoom in on the solution that we want to achieve, perhaps missing the alternative discovery, the thing that we were not looking for at all.

Wilhelm Röntgen, inventor of the X-ray, failed to achieve the intended specified outcome of his experiments, but achieved so much more instead. Röntgen had an open mind and rather than discarding the results as a failure, he opened up to the possibilities of what else could this mean.

Channelling your inner five-year-old

Many life-changing discoveries are a by-product of scientific exploration. But is it time we combined the deep intellect and domain knowledge of a scientist with the inquisitive mind of a five-year-old child? A five-year-old doesn't suffer from the belief that function is fixed. To them, everything is an exploration and the world, in all its wonder, is new. By the age of seven, many have already had their minds wired to see things in a particular way and, as a consequence, adults have to work very hard at seeing 'the spaces between'.

Unintended breakthrough

If history shows us that science has spawned so many unintended discoveries, what is around the next corner of unintended scientific breakthroughs?

Perhaps one of the most promising opportunities for 'accidental discovery' is the **Square Kilometre Array (SKA)**, the world's largest radio telescope currently **under construction** in the deserts of Western Australia and South Africa.

The SKA project is an **international effort** to build the world's largest radio telescope and will be a means of re-imagining our understanding of space and time as we know it. In actuality, the SKA is not a single gargantuan telescope dish, but a collection area of one square kilometre of radio antennas (called aperture arrays) arranged in a cleverly randomised pattern; listening for signals so faint that it would be able to detect an airport radar on a planet tens of light years away.

The SKA will effectively be a window looking back in time. It will enable scientists to capture enormous volumes of data about the origins of the Universe and how we came to be. Equally, they may be able to shed some light onto an inky, **unknown future**. Whether it be witnessing the birth and death of stars and galaxies, questioning Einstein's theory of relativity, or maybe even proving the existence of dark matter, the SKA will seek to unfold the mysteries of the cosmos and will almost certainly redefine our knowledge of human genesis, and maybe even our destiny.

While the technologies and the intended purpose of the SKA are incredible, what other benefits or **digital disruptions** could it provide to the world? What might be some of the other possibilities in the 'white space' where we are not looking? One example might be the ability to **make sense of big data**. The technology advancements made during the development of the SKA may not only help us understand the beginnings of the Universe, but will almost certainly help us in the relentless march towards the Internet of Things; when so much data and information is being generated that we don't actually know what to do with it.

The data stream received by the SKA is so huge that it can't be stored forever. In fact, the aperture arrays in the SKA could generate more than 100 times the global Internet traffic! In this instance, what the scientists may do is take a splice out of the data stream and then compare it to a later splice to see what might have changed. But here's the rub: it will be critical to ensure that now we have a means of 'looking', we don't miss the opportunity to truly 'see'.

In the absence of true data storage in the world of big data, instead we will need to look to pattern recognition. It will not be about data analysis itself, but looking for the trends in the data and then extrapolating from those steady state **trends to predict a future**.

To make sense of big data, we will have to channel our inner five-year-old. We will have to keep our mind open to the unexpected and the unseen. Blending deep technical data analysis capability with the curious mindset of a five-year-old will be what the captains in industry will need in order to find the next big thing that we never knew we were looking for.

IF MAKING A BUCK MEANT NOT CARING, WOULD YOU STILL DO IT?

Jody Boshoff & John McGuire

For many of us, the concept of 'sharing is caring' was introduced more as an ominous warning than a sweet adage in the home (especially when we happened to be holding the last cookie). But all motives aside, the message seemed to have got through to this generation; with an annual infusion of $15 billion into the global market, the sharing economy seems to be a case in point that spreading the love literally pays off.

These days, just about everything can earn you a quick buck if you're smart about it. That's what Judy learned when renting out an empty boardroom on **pivotdesk** to Craig who needed the space. Of course, Craig has been saving money and making friends through c**ouchsurfing.com**, whilst renting out his own apartment on **Airbnb**. Craig's guests are currently spending the day exploring the city by bicycle, thanks to Liquid's peer-to-peer bike share programme. And with dog lover, Bridget, on the job, the couple can rest assured that their beloved Baxter is in good hands with **DogVacay** while they're away.

Down the road, a single mom is using the money she made from selling those dusty fabulous heels on **Postmark** to rent Kim's ladder that she found on Snapgoods. And tomorrow Kim will heed Craig's request on **TaskRabbit** and take an **Uber** to the other side of town to prepare the apartment for the next round of Airbnb users. Six degrees of separation just became four in this new economy of collaborative consumption.

In one way, it's simply fabulous; the sharing economy cracks open fresh value on those underused assets around the house. Although, in another way, is the concept risky and our intrepid entrepreneurs have just not realised this yet?

The prolific pop-ups of sharing platforms are generally touted as ingenious, but do we have to acknowledge that we're realistically still in the honeymoon stage. This process has to see the whole cycle scoped through from macroeconomy to public policy if we are to grasp its long term impact on society. It's a robust debate that economists, policymakers, Craig even Baxter need to weigh in on.

Helping the planet

Our **future cities** are faced with a dizzying dilemma. According to a **2014 UN report**, two-thirds of the world population will be urbanised by 2050. Considering that another 2.5 billion people will have joined the human race by then, we have a serious case of imbalanced supply and demand on our hands. Naturally, any opportunity we have now to minimise our planetary wear and tear is welcomed. That's where the sharing economy can offer a brilliant alternative.

A **study** conducted by the Cleantech Group found that the fewer resources spent on travellers using home-sharing companies has resulted in 66% less CO_2 emission than hotel-based travel (including hotels that have earned five-star efficiency ratings). Home sharing has all kinds of other spin-off **benefits**, ranging from less food waste to higher recycling rates to significant savings in water. Car sharing also contributes to lightening the carbon load: according to a **UC Berkeley shared-use vehicle survey**, every one car made widely available for sharing takes at least 10 off cities' congested freeways. Each innovation seems to have us breathing a little easier, loosening the grip on our cities' necks and helping us to speak a new language of inventive opportunism.

Mind the gaps

But there's a flip side to the coin. The sharing economy is a fundamentally viral industry and, as such, it predominantly goes unmitigated and unchecked. The **digital economy is evolving so fast** it is outpacing the rate at which our policy makers can catch up.

Car-sharing network gurus like Uber and **Lyft**, for example, are generally not yet adhering to the same taxes and insurance standards that taxis uphold. Accommodation for disabled passengers is generally sporadic; contractual obligations are not articulated; and in some countries it's debatable whether drivers even make the minimum wage. Those subscribing to these platforms have to weigh up the privilege of making a buck on the side at their convenience versus the cost of being thrown in the cold if anything goes wrong.

The same goes with online hospitality. Startup giant Airbnb has booked over **80 million nights across 191 countries** since its 2008 inception. But many of those homes or venues may not be situated or designed to anticipate the challenges of noise, congestion, and waste, and neighbours are occasionally (and understandably) irritated about the additional infringements on their privacy. While hotels are taxed and frequently inspected for health and safety, Airbnb hosts are not yet facing such inspections.

Some city residents are now crying out for stronger regulation while, at the same time, many of their neighbours are greeting their ubers with open arms. Cities such as **Seattle**, who were already feeling the housing crunch before online hospitality entered the scene, now have to compete with the new breed of Airbnb entrepreneur who buys up accommodation for short-term rental purposes only. The San Francisco property market has sky rocketed, thanks to the influx of vacation rentals overtaking the city's scarce housing inventory.

The big picture

All of it begs the question, is the sharing economy actually benefiting the economy at large? Many would say it is, as even Granny can now find her inner entrepreneur and make her pension stretch. Yes, intrepid entrepreneurs are availing themselves of the new sources of revenue they can leverage out of their existing unused assets, but the warning to existing traditional businesses is that they are tapping into a customer who is dissatisfied and disgruntled with the current business models.

And therein lies the wake-up call to those awake enough to heed it. Shareable founder, Neal Gorenflo, would argue that these unregulated ventures are having a disturbing impact on the future socio-economic fabric and flow of our neighbourhoods and cities. He refers to Uber and Airbnb as 'Death Star platforms' that will eventually outstrip all facets of traditional competition.

Whatever side of the fence you're on, you can't deny the fact that Pandora's lid is wide open and off its hinges. Consumers now want choice. They are tired of faulty and antiquated services that call the shots and cripple creative mobility by clinging to the past. They seek the personal independence and disintermediation that mega start-ups like Uber and Airbnb defend. 'Death Stars' they may be, but ingenious opportunists who simply saw the gap and took it, they are as well.

At either end of the debate, the message is consistent and clear: business, beware. Those who fail to listen and to see what their customers actually need, disregarding the invitation to innovate, may very well be 'ubered' some day. In a sweeping digital paradigm that stops for no one, there will only be winners and losers. And businesses that believe they are immune to disruption are probably already on the way to being disrupted. They just haven't got the memo yet.

The debate is rich and all too early to draw solid line conclusions. Contrary to criticism, the growth of the sharing economy is probably not going to be a case of capitalistic 'checkmate' where Uber and their cronies take all. More likely, there's room for different players on the board. But traditional business will urgently need to catch up if they want to stay in the game. Should they stand around and wait for regulations to evolve and tighten the reigns, they will probably be too late.

HOW CAN DIGITAL TRIBES HELP US BUILD A BETTER WAY OF LIVING?

Frank van Rensburg

It's Monday morning, and for some reason, those electric banana yellow slippers have caught your eye online. You haven't gone so far as to buy them yet, but all day the Internet keeps serving up neon, fluffy pantofles in your face like an overeager shoe salesperson who won't leave you alone. (And furthermore, Google ads seem to think not only you, but your pet labrador deserves to have her name emblazoned on a pair. But based on the amount you spent on quality dog food online this year, the algorithmic odds are that you will cave and buy those matching canine booties).

If we didn't know any better, we would say **someone has been studying us**. The digital world is an analytical animal that relies upon sophisticated algorithms to engulf and interpret data, which is then spat out as a wave of direct personalised messages that seem to "just understand you". Often without knowing it, we are building our profiles, one bag of dog food, one slipper fetish at a time.

From these 'résumés' we unconsciously craft, digital interconnections are made and consumers are segmented into tribes. Whether it be acid jazz or sushi as the common passion, we find ourselves apportioned to communities that draw lines around shared personal preferences and lifestyle choices. These '**digital tribes**' are connecting and personal, and in some ways contrary to the common lament that technology has a dehumanising effect. And they have literally changed the way business does business.

But what if they could be used to change the way cities do cities as well? Could digital tribalism feed into our design practices, so that we build with particular people groups their habits and lifestyle leanings in mind? Could we determine the communities we want to attract, and then build accordingly? From where we're standing, it could mean the difference between crafting our cities and simply responding to the sprawl.

From sense of place to sense of purpose

Likeminded behaviours have always been of interest to psychologists and marketers. In the days when television, print and radio ruled the media roost, working out the target market for your product or service was less complicated, less scientific and therefore, less targeted. **Marketing** was thrown out over broad-scaled consumer bases like a net, in hopes that the message would be alluring enough to ensnare the buying power of its audience. Websites were thought to be proverbial flytraps; just get your viewers to stay long enough that they would 'stick'.

But the days of marketing based on demographics and geography are distant domains in the rear-view mirror. The new landscape in the windscreen is about common interests

over locale; shared values over a singular consumer-based commitment to product. The new normal is about understanding your consumer and feeding those passions and beliefs which ultimately drive sales.

"Traditionally, companies have targeted people by socio-economic groupings, but that misses the point," says Tudor Aw, Digital Media Partner at KPMG. "There is something about why a certain group of people are together around a certain service or interest that is much more powerful than simply their demographic group." And so, for that reason, digital and social media advertising is harnessing the power of online communities at a furious pace that is fast approaching a 50% share.

So, if this kind of constant analysis is unlocking magnificent new markets (e.g. the slipper lover may have a thing for doggie gyms too) and creating digital subcultures, the logic follows that our manner of city building should do the same.

Ticking all the boxes

Granted, the idea that people seek one another out and form geographical pockets, based on common aspirations, is not a new one. As cities have taken shape, people have generally flocked to the nook or cranny where they feel they can best relate and thrive. Young people typically want the vibrancy and interaction of downtown city life, while families with small children need the green space and security of the suburbs. There's generally a natural pairing which takes place, due to circumstances and values and seasons of life. This type of segmentation is almost reflexive, accidental and intuitive as a societal whole.

But what if designers could take our digital tools and make city building a far more intentional exercise? What if our developers could set themselves apart in an already-saturated apartment market by the way they 'tick every box' of the tribe they're targeting?

Take, for example, a building that aims to target urban **millennial professionals**. More than the view or the bus station around the corner, bespoke factors like embedded technology, sustainability in construction, and proximity to the organic food market would be important. A flow and functionality to the floor plan that supported a work-from-home lifestyle and minimalist philosophy would be equally imperative. The more granular the design elements, the more likely a community would be to resonate with them and ultimately attract their business.

Going big to get small

Before we aim to tick every box, how do we know what are the right boxes to tick? How do we even go about building these social profiles and designing in such a way that we hit the spot? Like anything, if we want to understand the finer details, we have to start by seeing the big picture. We take our hypotheticals and big questions and put them through a refining process. On the other end of our trial-and-testing-and-testing-again, trends emerge out of the fire, which in turn converge to form the 'right' design solution for that particular scenario.

The individual's needs don't drive design. Architect Eliel Saarinen said instead, "Always design a thing by considering it in its next larger context a chair in a room, a room in a house, a house in an environment, an environment in a city plan." Ironically though, as we study the movement and meaning of small collectives, we end up meeting the individual's needs in the process.

Urbanist Jane Jacobs says, "Designing a dream city is easy; rebuilding a living one takes imagination." If we want to brace the oncoming blow of unprecedented urbanisation, we have to reimagine design and crack open new monetary value in the building industry. Digital tribes will help do just that making design both the process and the outcome the product and the vproducer of the kind of resilient, connected and meaningful worlds we envision.

THREE GUYS WALK INTO A BAR...

Michael Gardiner

The opening line 'Three guys walk in to a bar...' has fuelled the material of comedians from Lenny Bruce to Jerry Lewis. For a surfer, a gamer and an engineer, it plays on our notions of stereotypes of beach bums, computer nerds and analytical types and we are waiting for a punch line that ridicules at least one if not all three.

But, dig a little deeper and surfing is now a multibillion dollar industry with its own YouTube channels and international holiday and gaming is undergoing a similar revolution.

Until recently, mainstream society relegated fans to the realm of geeks, nerds, and basement-dwelling dorks. But, in the last few years, the strangest thing has happened: gamers have suddenly become cool. That's because the technology, once exclusive to their esoteric knowledge, has evolved and attracted the interest of diverse fields seeking better software solutions.

Tools like game 'engines', virtual reality and augmented reality (+ pizza) are no longer an alternative to Friday night boredom; they're seen as powerful platforms to engineer extraordinary designs. More and more game technologies are solving problems to the challenges we're facing, because they are very good at what they do.

Want to be a next-level engineer? Ask a gamer. Better yet, pass the pizza and see for yourself.

So what's the fuss about gaming?

If you've ever played games, you'll know they vary, depending on their purpose and their genre. What is needed to build Grand Prix 3 is entirely different to what Call of Duty requires. A game engine doesn't know what style of game you might want to make, so it allows coders and programmers to dig around the backend and customise their designs. And if you're still not happy with what you've been given to work with, the game engine allows you to go out and build it yourself. It's the harder way (more knowledge, more time, more money), but it's the only way to create truly bespoke solutions.

Now imagine a job where the technology dishes you up a blank slate on which to write. What would you build if you could throw off the shackles of software constraints – if you never again had to explain to your project manager or client that 'the software doesn't let me do that'? If you were tasked to reimagine 3D model data and the right technology sat at your fingertips, what couldn't you do?

Gaming engines are empowering, because they offer platforms on which to design and innovate towards what you dare to imagine. The technology doesn't ask you to reinvent the wheel and write a software solution from scratch. Instead, it gives you the framework and the tools to start small and then think bigger. You can program subtle changes, or you can roll up your sleeves and dive deep into the heart of the engine to forge truly unique functions. It means we can be more focused on inputting 'what if' and not just 'what is' to arrive at 'what might be'. The emergence of gaming technology in the world of engineering is allowing the mind of the engineer to take flight and, in so doing, imagine a better world through better design.

Getting inside our designs

In the past, we designed by observation. Projects were pitched through movie formats and static visualisations and concepts were left to be envisioned in the mind's eye. But now design is interactive, intelligent, engaging the user on every level.

Manufacturers and machine operators can pull a 3D virtual product into reality before its parts have even joined the assembly line. Thanks to Virtual Reality (VR), we can now **walk around our designs and experience them** from every angle, analysing as much as 'feeling' our way to a more refined solution.

Head-mounted displays (HMDs) such as HTC Vive and **Oculus Rift**, used by a **number of today's games**, give designers and engineers an immersive 3D interactive experience, and reveal new worlds of invention and productivity. Augmented Reality (AR) headsets such as the Microsoft Hololens can overlay instructions, maps, system information, or real-time feedback over a worker's field of view. And some applications allow colleagues to collaborate remotely over the same virtual space.

The result is that issues can be troubleshot and error can be avoided. That's what **Boeing engineers** found, after replacing assembly manuals with smart glasses displays and seeing a decrease of 25% in wiring production time. It also means that formerly impossible feats are becoming doable, such as **NASA's latest Mars Rover project** that uses **HoloLens** technology to bring the experience of space exploration straight onto the design floor.

By immersing themselves in a virtual space reality, designers and engineers are not only able to visualise in 3D; they can literally get in, on and around the potential problems that threaten future space missions. Says Matthew Clausen, lead designer of **ProtoSpace** for the NASA endeavour, "Being able to see it in the space, walk around it and put their arms in the hologram allows engineers to uncover a lot of solutions. [They can] discover problems they didn't even know existed."

It's just a matter of time

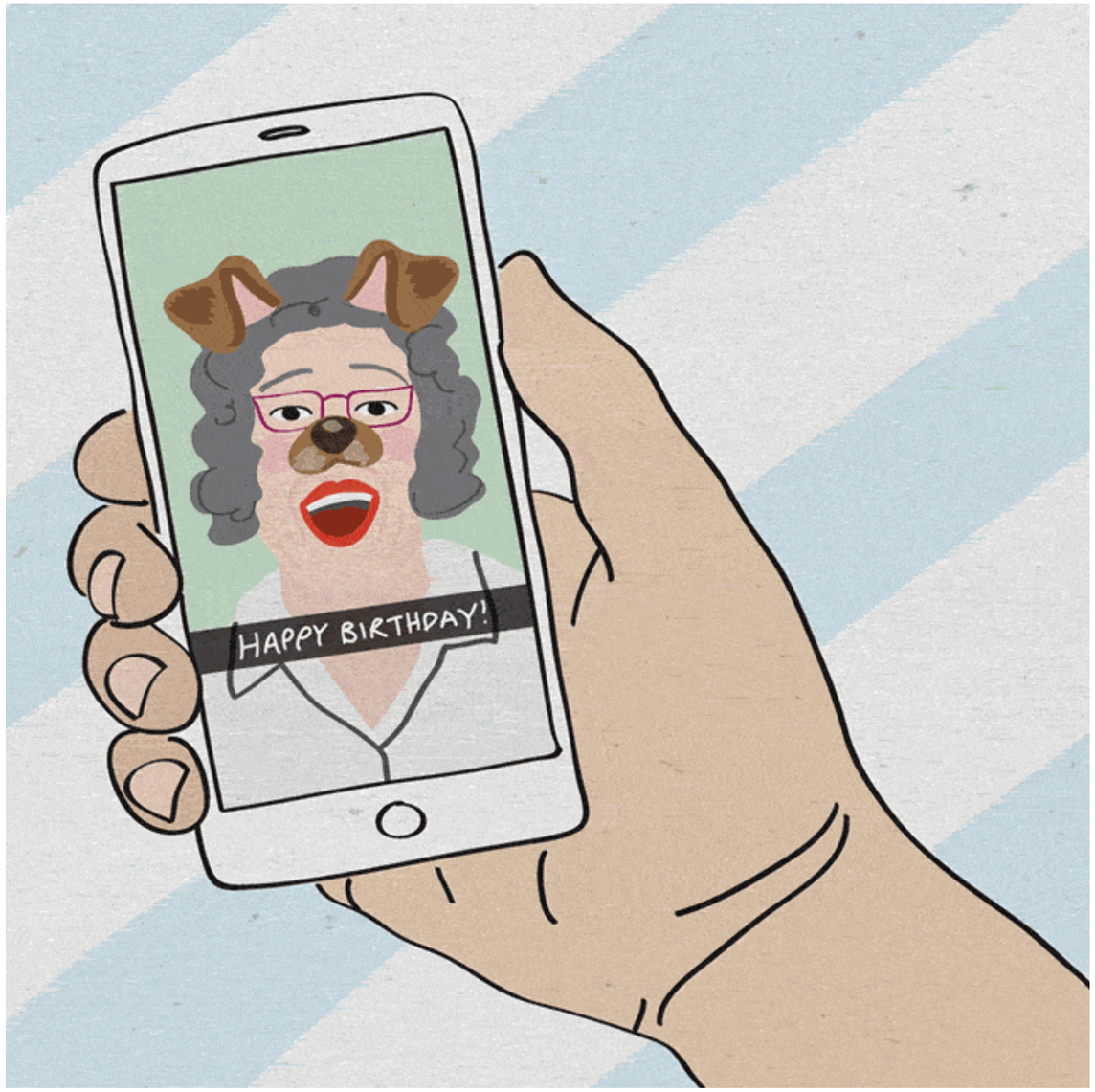
The fact is, more employees are catching onto game technology and starting to pull the headsets over their eyes. According to a **Deloitte internal report**, AR/VR solutions are being tested or have already been rolled out by over 150 companies from multiple industries, including 52 of the Fortune 500. And according to the IDC, worldwide revenue from augmented and virtual reality is projected to grow from $5.2 billion in 2016 to $162 billion by 2025. Its adoption is not really a matter of if, but a matter of when.

Companies would be wise to take heed because game technology is improving by the day and becoming more customised and accessible to a whole world one floor up from the basement shadows. As applications keep getting better and tailored to the end user, more and more companies will seek its tools as a way to stay one step ahead.

The punchline with a surfer, a gamer and an engineer walking into a bar is that this is now more and more likely to be one person rather than three. And that person is as passionate about redefining the world of how engineering design is done through visual thinking as they are about catching the next beach break, dude!

DON'T UNDERESTIMATE YOUR GRANNY WHEN IT COMES TO GOOGLE

Rowland Burke



These days, with the pace at which technology is outdoing itself, it's virtually impossible to hold your high ground as 'king of the hill'. As soon as we flash the latest iPhone, a new one is flaunting its 12 MP camera with ƒ/1.8 aperture at us. Just when we've nailed the art of geomapping, drones are brought in to scan and map work sites at a fraction of the cost and time. Tablets at this rate will be relegated to the ranks of LPs and fax machines - old school inventions that will have our own kids feeling old when their children laugh at what was once so 'cutting edge.' It's a marathon and a sprint in one; but the finish line feels nowhere in sight.

For children who've been unlocking iPads before riding tricycles, technology is Reality 101. But for many grandparents, the thought of overlaying furry kitten ears onto our Whatsapp profiles would be impossible, much less moronic. Thus, they are easily detached and disconnected from these trends, as technology furiously gallops on. And somewhere between the gap of tech savvy and technophobe is a market that demands attention, if we want to keep cornering our capital advantage.

Traditional marketing says that you need to keep catering for the masses if you want to stay ahead in this business world. And the perception is that one of the older generations is standing perplexed on the sidelines, lost among the hashtags, the trending, the likes, or the filters, that are happening online all at once. This is only half the truth.

The other half is that **Baby Boomers alone (born between 1946-1964) represent the #1 consumer-age demographic in the United States** – and their investments in everything from travel to health care to e-commerce are only growing. Couple their collective consumer power with their longevity, and suddenly the need to integrate our silver economy into today's digital retail experience goes from a good idea to a downright imperative. Clearly, it's a no brainer: the digital economy is not only for the generations who will take the future, but for the generations who got us this far.

Going strong at 55, and counting

Currently, the 50+ demographic is batting at 111 million strong in the USA, while 25% of the EU population is comprised of older citizens. So vast is the US silver spending power that their total $3.2 trillion a year outweighs the GDP of nations such as Italy, Russia, the United Kingdom, Brazil and France.

The population is a formidable economic force to be reckoned with. But here's the clincher this global group is only growing. Retirement plans are extending, as people are expected to live longer than projected. In fact, by 2025, the 50+ will outnumber their

American youth 3:1 (a 2:1 ratio in Europe by 2060), and there will be more very elderly people in the EU than children under five.

This is an almighty pill for our pension plans to swallow; but for businesses willing to rethink their brand and delivery, it's a recipe for market opportunity. The **need to address our needs** doesn't stop when we hit our 50s or 60s. In fact, to some extent, that's when we need it the most. Older and frailer populations bring a new set of physical, emotional and health needs to the table, which (with the right offerings to match their technological competencies) can open big business doors.

Boomers find themselves tight pressed in the sandwich generation meeting the needs of their elderly parents while delaying shoving their **Gen X/Millennial kids** out of the door. In other words, they have everything from arthritis medication to IOS upgrades on their plate to tend to. Business would do well to consider the 'everything in between' and offer ease in providing it. After all, technology or innovation (when done for the right reasons) is for everyone — no ifs, no buts, or age limitations.

More savvy than you think

Contrary to public perception, many of our silver citizens are not tech adverse. Considered the first 'digital immigrants', a swelling proportion of the 50+ demographic is cosying up to Siri and learning to order those groceries online. In fact, a Pew Research Centre report found that 59% of seniors (ages 65 and older) use the Internet regularly, and 47% say they have a high-speed broadband connection at home.

And when it comes to shopping on mobile, **one in four people aged 55 and older** prefer to shop from the couch, according to a report by BI Intelligence. Cyberspace provides socialising, shopping and learning opportunities for people who are increasingly isolated and physically frail (so much so that 90% of affluent households can be found surfing on a daily basis). The stats seem to suggest that Granny might just surprise you these days.

Adapting the experience

The key, however, is to meet Granny where she's at. This not only translates into the kind of products and offerings we need to consider; it refers to the way we understand their lifestyles, and how we can offer a more relevant retail experience to a conventional demographic. For example, as older adults 'age up' and join the digital revolution, **Evelo**, an electric bicycle start-up company, is also 'reaching down' to meet their targeted senior market, by providing 'Ambassadors' who visit your home and help with a test drive.

Aside from this, companies also need to consider the distraction of flashy ads, cookies and pop ups for a 50+ clientele, and simply 'get to the point', with a convenient click to a real live person who can walk you through the process. Online chats where consumers can connect over honest, real time conversation is more effective than all the trendy hashtags that operate as Millennial magnets.

We need to blend the physical and digital into one seamlessly integrated showroom, stocked with inventory, rewards and promotion, like the sense of one-to-one engagement and customer care that an **omni-channel experience** offers. It's as close to 'walking the department floors' as can be from a thousand miles away.

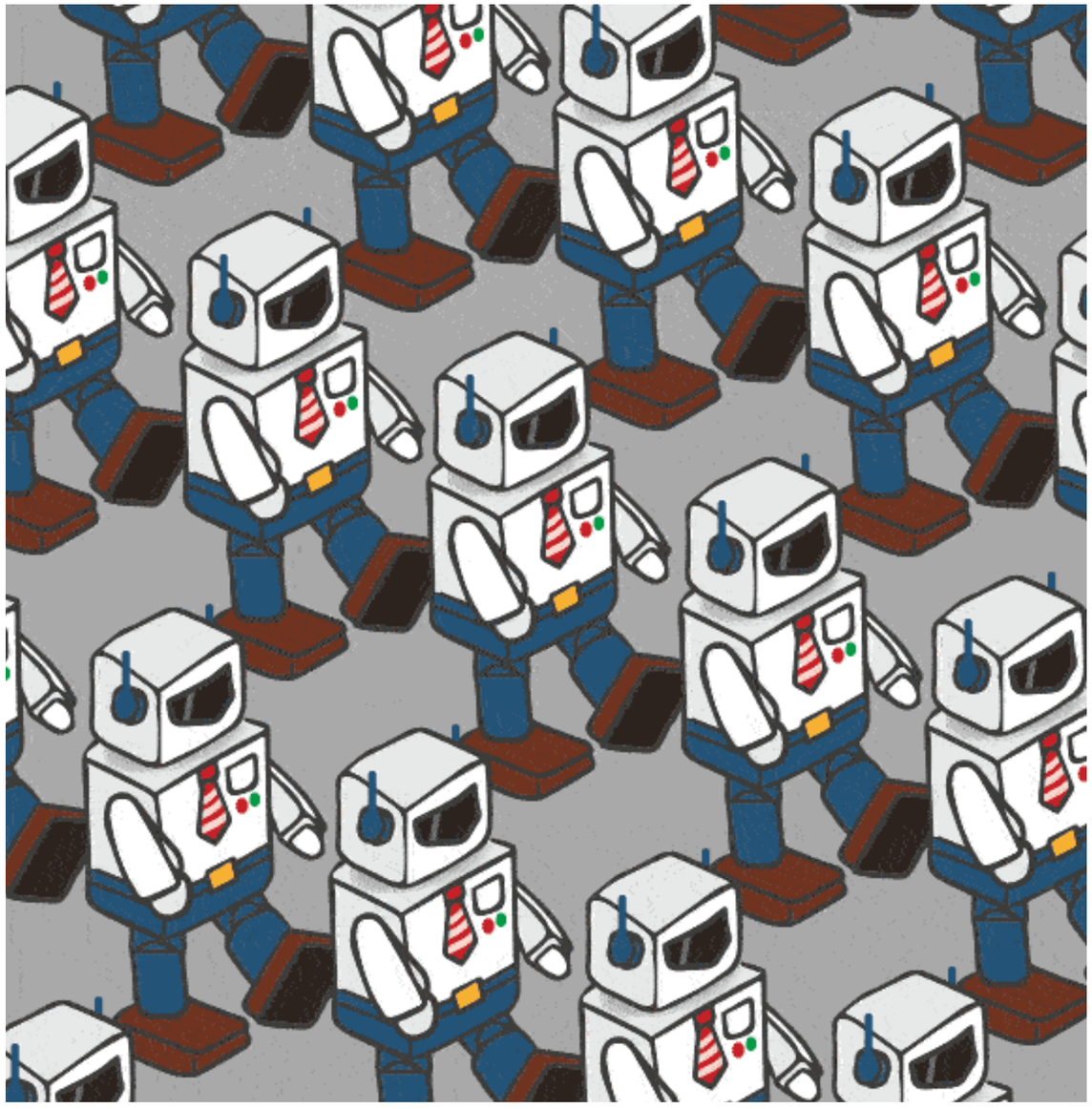
Let's face it. The silver economy is a goldmine. It is a market that has existed 'ever since', buried under the sand, and is now waiting to be dug up and tapped. There are many needs to be addressed, and difficulties that we can ease. The opportunities for technological solutions are endless!

The key though, to extracting the silver economy's precious value, is in adapting our digital landscapes accordingly to bridge the generational divide. Some of that comes with education; some of it with innovation. (And yes, that means it would do us well here to bring our high tech a little lower.) But the more we can approach this journey by integrating the past, the better future we'll forge.

By the time Millennials reach their 50s, 60s, or even their 70s, smartphones, **Virtual Reality goggles** and drones may no longer be their thing, but they will still use technology for the same effect it has on their lives now: easier, efficient, and more comfortable. Now, that sounds like something Granny might find on Google and click on.

SEEKING OPPORTUNITY IN A 'ROBOPOCALYPSE'

Brad McBean



We've heard it all before. Robots those elusive job munchers are making their way to an office near you. And the message is clear: they are smarter than you, they are cheaper than you, and they won't vie for the corner office… like you. If it's not YouTube, it's our friends at **TED who splatter our screens with stats** and remind us to stay afraid, very afraid of the imminent **robopocalypse**.

After all, it's not just the postmen and snow plowers and plumbers who face the dirge; the professionals in white coats and collars have reason to steady their knees when pit against the innovative power and pace of artificial intelligence.

Don't believe it? The fact is, it's already been happening for years. Just think about how easy it is now to check in your own baggage at the airport. Only a few years ago, we were at the whim of airline staff to do it for us. Or how about when you would plunk your groceries on the conveyor belt and watch the friendly cashier scan your cookies' bar code? Now it's your job, my friend. The milkman who knew your name? The travel agent? The DVD shop that boomed on Friday night? All of them gone. A distant memory.

To think the march stops here would be downright absurd. It's only the beginning. So putting our heads in the sand of the **great disruption debate** is not an option. We need to think around this clearly.

If you are an employer, constantly squeezed by margin pressure, looking for efficiency, what do you do? Do you invest in technology, knowing that you could render your workforce redundant? (After all, you still attend those town hall talks that say "it's all about people not silicon chips and profit.") Do you hold your nerve in the hope it will never happen only to have your competitor make the leap and grab the corner advantage? And for you, the employee what do you do? Join a picket and start marching?

We don't think that any of these are smart options. Working the problem collectively is where we think the answer lies. The reality is, only some tasks are facing immediate replacement, and so it is in those spaces, where time and money find new slack, that we must seek out fresh innovative seed. Beyond the obvious but short-sighted solution of reducing staff numbers, how about thinking long-term and forging new value out of unique circumstances? Perhaps humanity doesn't have to end up "on their knees", as Robopocalypse author **Daniel Wilson** suggests. Perhaps there's the whiff of reinvention in the air.

Finding the gap...

Don't get us wrong. There's good reason to perk up maybe even panic, if that's the fuel needed to move into new paradigm thinking. But **McKinsey's latest report on automation displacement** reminds us that, although almost every occupation has partial automation potential, humans will remain an essential ingredient in the future workplace equation. Even those jobs that can be easily automated, such as nursing or teaching, rely heavily on interactions between people and expertise that stretches beyond the knowledge of facts.

Where the design and construction of cities of the future depend on public participation, the role of human creativity and ingenuity will keep rising to the top. And for machines that excel at analysing structured data, creative thinking will always remain gold, which is why future-thinking organisations are placing more emphasis on innovation and **fostering creativity**.

So, while a future with AI might mean the factory floor is inhabited by more affordable, time-efficient robots, designers and engineers will have more time to imagine, create and build; clients will have more choices; and niche opportunities will find new traction.

...also makes new jobs

Others would say that AI and robots are creating a whole new job crop. Although an estimated **78% of predictable physical jobs in the US** (such as packaging, food preparation and assembly line work) are under replacement threat, robots will never have the technical world waxed. So long as there are machines, there will be glitches and maintenance and updates required. All the more, we'll need skilled labour and expertise to manage and maintain these emerging technologies. The robot will need replacing, the driverless car will need a tweak. And odds are good for still some time, it will be the human hand to do the fixing.

New jobs will open up. Just as digital has given birth to the IT world, with titles like 'network administrator', 'field service technician' and 'web developer' now mainstream occupations, so too will the same phenomenon unfold in science, technology, engineering and mathematics. Furthermore, in other fields, according to a **2011 study**, jobs are likely to triple from automation. Experts say, for every one million industrial robots created, nearly three million jobs are directly needed to support them. They even argue unemployment rates will drop, as they did for five of the six countries examined in the study.

Are we taxing the wrong 'people'?

Indeed, the subject is a bit more complex than a one-sided end-of-the-world scenario. We can envision a future of coexistence, but we must ask the big questions now and ensure that conscience leads the way. Should robots be taxed like normal citizens, as Microsoft co-founder Bill Gates proposes? It could be a way of slowing down automation and even funding jobs in human-centred sectors such as caring for the elderly and teaching children. And what's stopping us from asking, should we ban robots in some industries altogether?

These are the questions we need to be asking. These are the grey areas we need to define. If we do it well, if we stay agile and inventive, and if we keep eyes peeled for opportunity, we're likely to dodge our own demise and remain the future's authors.

AI: EVIL OR AVATAR?

Matt Gurr

You don't have to be a sci-fi wizard to remember Avatar**. The 2009 fantasy blockbuster was equally entrancing for trekkies and school teachers alike.** In the epic science fiction film, writer and director James Cameron envisioned a new world inhabited by an alien species known as the Na'vi, who lived in perfect harmony with their deity, Ewya, on an exoplanetary moon known as Pandora.

All was well, a perfect display of symbiosis between nature and its inhabitants until the human race had to show up. And once again, it was a case of 'winner takes all', where the collective force of human greed was unleashed to tailspin perfect order into chaos.

Albeit fantastically far-fetched, there was something deeply resonating about the movie. What made Avatar rack up two Academy Awards and USD2 billion was more than just great special effects and Sam Worthington's acting. It was the sense that 'this is us now and this could be us later.' The plot was a familiar one, with humanity as the classic villain, willing to plunder paradise for temporal gain but to their ultimate demise.

In 1974, biochemist James Lovelock posited a new paradigm known as the **Gaia theory**. Essentially, he said that organisms and their inorganic surroundings have evolved together into one living, self-regulating complex system over time. The biota, or web of interdependent organisms, have determined everything from global temperatures to ocean salinity anything that would ensure "life maintains conditions suitable for its own survival". In short, life has been making a way for itself over countless centuries.

We might not be able to tap into the whisperings of Ewya like the Na'vi did on Avatar. But, what if we could tune into the undertones of the biota? Our technologies are advancing concurrently and exponentially, synthesising billions of intelligent devices into a single cloud-based ecosystem known as the Internet of Things (IoT). As our systems will get smarter, so too will our ability to understand their interconnectedness.

Imagine the transformative power we could unlock if we could see the cumulative impact of a billion small actions in motion. Could IoT be the hero to save us from ourselves?

The laws of consequence

The concept of consequence is nothing new. Scientists have been studying its behaviour for centuries. Newton reminds us in his third law that every action has an equal and opposite reaction; Clausius and Kelvin tell us in the first law of thermodynamics that energy cannot be created or destroyed only transformed from one form to another. So, when we extract oil from the earth, transforming its thermal energy into kinetic energy to turn a turbine to generate electricity for our household use, we have to know there will

be a consequence on the other side of the equation. Look no further than our melting ice caps for exhibit A.

But, as our devices become all the more embedded with intelligence, and IoT rolls merrily our way, we have less excuses not to connect the dots into the future. Machine learning will increasingly make sense of the vast oceans of data flooding in daily, filtering out helpful insights and patterns to enable improvements in nearly every sphere of life. Machines will most probably get very good at pointing out the opportunities and pitfalls, and we will be left to steward these key insights.

An apocalyptic alternative

Of course, there are warning lights everywhere. The ubiquitous concern is that we're frantically investing in a world order that could potentially outrun our human capacities and ingenuity, offering no promise to keep us in it some day. Experts like **Nick Bostrom** warn us of the grave danger in controlling AI, including Elon Musk who **predicts its powers to trigger WW3** and eventually wipe out humanity.

But apocalyptic singularity is only one way of looking at it. Some of the world's top entrepreneurs are suggesting a more cooperative, hands-on approach to the issue. Industry leaders such as Eric Schmidt, Peter Thiel and Elon Musk have **invested billions** in the research and promotion of ethical AI to 'benefit humanity as a whole'.

Called **OpenAI**, the new non-profit is aimed at developing artificial intelligence that will serve as a tool to help solve major challenges, including climate change and food security. They argue our technologies can become forces for greater good, rather than shovels for our species' grave. Says Facebook's chief technology officer Mike Schroepfer, "The power of AI technology is it can solve problems that scale to the whole planet."

The maths of morality

If technology is able to zoom in and out, offering more micro and macro insights into human behaviour and impact, how do we ensure that insight will translate into ethical action? In other words, how can we make sure the robots and 'biota' and 'Mama Gaia' will all want to be friends?

The question is not so easy, when you consider the complexities of overpopulation, short-term profit gain, and demands for environmental protection, all running side by side and vying for more on top. If we ever want to tap into the heartbeat of our own Gaia, we'll have to invest far more in the algorithm of ethics.

Says **Pedro Domingos**, author of the recent book **The Master Algorithm**, "I actually don't think it's that hard to encode ethical considerations into machine learning algorithms." However, he notes: "The big question is whether we human beings are able to formalise our ethical beliefs in a halfway coherent and complete way." The real issue is, as custodians of a moral code, are human beings even able to articulate and agree on what's right and wrong?

At this relatively early stage of AI advancement, the onus is on us to intersect and qualify the moral code for sustainability, planet and population alike. If we can learn to connect our technologies to understand the rhythms and impacts of symbiotic living, we may not have to strap those moon boots on and plan our earthly exodus just yet.

Perhaps the notion of Pandora was not as 'out there' as it seemed. Our world is extraordinarily interwoven; we may just be building the tools to interpret and manipulate its complexity for the better. But as systems sophisticate, the question governing our future will not be so much how we will steward this responsibility, but rather will we?

IS A MASTER OF FINE ARTS THE 'NEW MBA'?

Fiona Fitness

From Richard Branson to Bill Gates, 'creativity' ranks as one of the top ten traits of all billionaire entrepreneurs across the globe. This despite the fact that engineering, medicine, business and the professions have long held the high ground of traditional academic degrees. That said, will we soon see the demise of the MBA?

For the past thirty years or more, the MBA has stood as the badge of entry into the wider, established business community and many successful leaders have used it as a springboard for corporate success. The MBA has enabled many engineers or accountants to make the transition into the higher echelons of corporate leadership and exclusive boardrooms.

However, while MBAs offer valuable grounding, they are vested in analytical thinking: they teach us to find 'what is true'. Yet the business world is increasingly characterised by hyper competition, disaggregated supply chains and a smorgasbord of choice for consumers. In this environment there is an imperative to embrace creative and intuitive thinking in favour of analytical thinking, in order to succeed where consumers are looking for delight and memorability. In a highly commoditised market, it is our **creative minds which cannot be replicated**.

In 2011, **Google's vice-president** for consumer products declared: "We are going through a period of unbelievable growth and will be hiring about six thousand people this year – and probably four to five thousand from the humanities or liberal arts." If the MBA isn't as relevant today as it always was – what are the essential credentials or skills needed for reaching unparalleled achievement?

Tim Brown, CEO and president of the international design consulting firm IDEO, **believes** that "We need to use the techniques and methodologies of design to bring hypotheses and proposals out into the world much more rapidly and try them out and evolve them

in real life, rather than spending months, years, or even decades writing hypothetical reports in policy think tanks where it doesn't actually have much of an impact in the end."

Similarly, **Roger Martin**, former Dean of the Rotman School of Management, considers that "The only way that you can get organisations to change is to give them different tools."

Both of them advocate a shift in traditional business education, with Martin commenting that with America producing 150 000 MBAs annually, we're in danger. "If they're all being taught how to analyse things to death, that's going to affect how they'll shape the future of business."

In both of his books, **The Design of Business** and **The Opposable Mind**, Martin explains the virtues of thinking differently. He maintains the secret to success lies squarely in the domain of thinking (the arts). He cautions that following best practice poses a danger: "By emulating what a great leader did in a particular situation, you'll likely be terribly disappointed with your own results. Your situation is different. Instead of focusing on what exceptional leaders do, we need to understand and emulate how they think."

Martin shows how integrative thinkers are relentlessly diagnosing and synthesising by asking probing questions, including: "What are the causal relationships at work here?" and "What are the implied trade-offs?" He advocates drawing on different kinds of knowledge, including conceptual and experiential knowledge.

In line with this, the **challenge for engineers today** in a commoditised market has ceased to be technical perfection which is easily replicated. It's about problem finding, problem solving and tackling ambiguity with a creativity bent on reimagining a future and designing ways to get there.

Successful businesses of the future would do well to heed the arts and bring them back to business. Extend this even further, and enlightened universities are now embedding the principles of design and creativity into their business and engineering schools. They are starting to recognise it is what successful businesses of the future will want from their graduates. A good example is the Bachelor of Creative Intelligence and Innovation at the **University of Technology in Sydney** where **design thinking** is taught to undergraduate engineers, accountants and marketers.

The classic example of this propensity is Steve Jobs – the poster child of business success. His pursuit and realisation of beauty had little to do with a formal business degree. From working at a video games manufacturer, he quit to spend seven months wandering across India looking for spiritual enlightenment – a far cry from any MBA classroom. In his famous commencement speech at Stanford University, he also acknowledged **Robert Palladino**, the Trappist monk who instructed a calligraphy course at Portland's Reed College, as inadvertently inspiring the elegance for which Apple computers are renowned today.

"It was the first computer with beautiful typography," Jobs said. "If I had never dropped in on that single course in college, the Mac would have never had multiple typefaces or proportionally spaced fonts." Jobs put an emphasis on function, stressing the importance of usability and usefulness while accentuating the form, which serves the more aesthetic and perhaps social needs of customers. No company has achieved such heights of success by producing beautiful products as Apple.

Today's successful engineer should be **driven by business** and technical knowledge together with art. We are living in a transition time and this time calls for **new models, a new management mindset** and new management tools. Art is an important, dynamic part of the mould that makes up the progressive business climate today.

Should we be studying Tchaikovsky and Shakespeare at the same time as the management theories of Peter Drucker? One thing is for certain: relying on 'business as usual' in today's landscape is as good as staying on board a sinking ship.

COLLABORATING TO COMPETE – YOUR ENEMY COULD BE YOUR BEST FRIEND!

Tristan Ilich

In October 2007, two cash-strapped college graduates, three blow-up mattresses and a home cooked breakfast changed the way we define spaces forever. Airbnb started in 2007 when two hard up students, both 27, were struggling to pay their rent.

A **design** conference was coming to San Francisco and **hotels** were fully booked. The students decided to compete in the **hospitality market** and rent out three airbeds on their living-room floor and cook their patrons breakfast. The next day saw the creation of airbedandbreakfast.com; and just six days later the students hosted a 30-year-old Indian man, a 35-year-old lady from Boston and a 45-year-old father from Utah. They charged them $80 each a night. As the students waved them goodbye, they looked at each other and thought, 'There's got to be a bigger idea here'.

Now with over 2 000 000 listings in 34 000 cities and 191 countries, Airbnb is a prime example of the emergent '**sharing economy**' – an ecosystem in which everything from beds to bicycles to lighthouses are rentable commodities. The idea is simple but radical and a testament to the growing trend of '**collaborative consumption**' in which physical assets are easily disaggregated and consumed as services. Our stuff (and our bright ideas) is assigned new financial value when accessed, shared and utilised by others.

Essentially, what we are seeing is the sharing of underutilised assets as a means of beating the competition. Although this sharing economy operates on a peer-to-peer business approach, could the same dynamic be applied on a business-to-business scale? A joint venture would see two or more companies band together to beat the competition, but taken a step further, should these same businesses learn from the sharing economy and share office space, delivery vehicles and even HR systems in order to compete?

Could there be a really clever new order in which businesses analyse their productivity and utilisation profiles and then find someone else whose profile is counter cyclical to their own (as opposed to the same – which is the foundation of most joint ventures) to join resources with, to ensure their assets are 100% productive.

Is the old model of building bigger and better on your own, cracking at the foundations, giving way to a more inclusive and porous business methodology? Rather than staking their flag deeper in the ground, large-scale corporations and professionals (countries even) need to think about working with their competitors in order to win. If we are to stay ahead in today's economy, collaborating with the competition may be more than a cutting-edge strategy; it may just become the bare necessity.

Redefining the neighbourhood market

Today, with no prerequisite investment or qualification, you can sell your wares anywhere in the world. This is largely due to a growing mass confidence in online consumerism. At first, people were wary about security. But having made a successful purchase from, say, Amazon, they were more confident to buy the next time from eBay... and so the spending story continued.

Online retailers have essentially trained customers over time to be comfortable making remote purchases and trusting in faceless vendors to deliver their goods. Rather than 'killing small business,' Amazon and others have activated new market opportunities. A niche service that was once handicapped by locale can now secure tractions outside of its neighbourhood borders.

Services have joined the market

In the same way, there is a growing trust and trend towards selling services and skills globally. Like Uber or Airbnb that piggyback off people's personal assets, online platforms are available for professionals to offer their skills. A job is posted and professionals tout for the work based on competency and profile. It's also a clever way for professional services practices to mop up their employees' unutilised time.

The services rendered via these platforms are timebound, cost-efficient and streamlined to the task at hand – a **potential disruption** to professional services firms who aren't alert to the need to evolve. In tomorrow's economy, those who see themselves as a global, connected ecosystem able to provide information and skills, sharing via a single system with similar standards for quality and production capability, will hold massive advantage. This smarter way to maximise results will see globally-connected workforces working ubiquitously in a digitally connected environment and will trump fragmented platforms without much guarantee for users every time.

Understanding the ecosystem

In May 2016, **Simon Moutter** of telecommunications provider **Spark** led a delegation to Israel in order to learn what made this small, young nation a world leader in innovation. His findings were phenomenal. Their innovative environment can be best defined as an ecosystem – a holistic community of interactive and symbiotic elements that function interdependently.

Across the university hallways, corporate boardrooms, research institutions and government departments, there is a predominant atmosphere of connectivity and mutual honour. Everyone seems to know each other; self-protectionism has lost its stronghold under the banner of collaboration. Because the nation has no natural resources, innovation has become the proverbial gold to secure their global competitive advantage. And so, with government architecting and underpinning the entire ecosystem, entrepreneurialism is championed and hoisted high by government, private sector, and academia alike.

If nations want to keep their competitive global advantage, they need to find their own common **innovation narrative** on home turf. True collaboration means everyone has a role to play in bringing ideas to market. '**Hunting as a pack**' – communicating a 'one nation' story across all spheres of business and civil society – will position national markets to win in the global arena as well. Large companies need to leave their silos behind if they are to compete. Similarly, small, one-city only companies should heed the call for collaboration... before it's too late.

SHOULD WE FORGET THE NEW YEAR'S RESOLUTION?

Giam Swiegers

Come 1 January and most of us feel pressure to make resolutions to improve something which, frankly, we usually weren't any good at to begin with. "Take up playing the ukulele"; "Become a better cook"; "Improve my gardening"...

By 17 January, you've usually lost all momentum and once again regressed. If this sounds like you – please stop feeling guilty immediately. In fact, you should actually feel pretty smug. Focusing on what you aren't good at is a waste of time at best. If you work on your strengths you might be brilliant; but if you work on your weaknesses, you may only ever be average. And who wants to be average at anything?

Discover your strength

Historically, we've been programmed to think that 'good parenting' is telling your children: "You can be anything you want to!"...or is it? Modern wisdom (and psychology) now seems to suggest the exact opposite.

Well-known psychologist Dr Martin Seligman, who coined the phrase '**Positive Psychology**', believes that for a person to be truly happy and live a life that is meaningful, you must understand what your personal strengths are in order to use these to reach your full potential. If we took Seligman's advice, we'd spend far more time trying to uncover our personal strengths and not waste valuable time and effort on things that take us away from doing what we were made to do.

When we focus on leveraging our natural talents, we play to our strengths and exhibit our greatest potential.

Ever heard of the world's best juggler? **Mikhail Rudenko**, born during the 1950s in remote Ukraine, had a passion for juggling and juggled professionally as well as taught the same. In 1978, he started to practice with 12 balls and achieved a personal best of 16 catches (each catch with two balls). The 'official' record for the **most balls juggled** was set by Alex Baron (11 balls) in 2012 – no one has been able to top Rudenko's feat.

Interestingly, he has been quoted as regretting that he wasted his time and energy on juggling with other props and if he could start from the beginning again, would practice using only small balls. If someone had told him what he was doing was impossible and that the world record one day would be only eleven, I believe he would have replied "nobody told me it was impossible". He had simply done what came naturally.

Diversity not consistency

Have you ever been part of a team that just doesn't work despite the best efforts of everyone around the table? Or maybe you've experienced the opposite – a team able to deliver time and again with everyone 'on the same page' and consistently motivated.

In the 1970s, management psychologist **Dr Meredith Belbin** discovered a way to predict the **success of teams.** His research involved business simulations which divided up participants according to their different psychological types – introverted/extroverted etc. During a five-year period, he hypothesised that there are certain patterns or clusters of behaviour which **predict team success** and that individuals often have a preference for one or more of these clusters. Another discovery included that no one team is ever perfect for every task.

At the end of the study, he was able to accurately predict which teams would succeed at projects by analysing the strengths a group of individuals brought to a specific team engaged in a specific task. His analysis reinforces the fact that team success relies on interdependence and the right 'mix' of its members' strengths.

For industry, is this a clear call for change? Now more than ever, amid world volatility and **seemingly insurmountable problems** that include **climate change** and the **growing health crisis**, there's a need for **diversity of thought**. We have had so many people that looked exactly like us running the world before and this hasn't (yet) resulted in significant improvement. We need a radical shift away from what we've done before, if we want results that are different to what we've always achieved.

Dr Ute Hülsheger, an Associate Professor of Work and Organisational Psychology at the **Faculty of Psychology and Neuroscience** at Maastricht University, is also a proponent for diversity of thinking. She advocates for diversity in skills (job-relevant diversity) as a major contributor to innovation, although she does caution that careful thought and curation are required in terms of diversity of backgrounds on a team in order to achieve the diversity sweet spot.

Interestingly, each one of the nine team roles Belbin formalised has what he calls an 'allowable weakness' – reinforcing the fact that we do not have to be good at everything all the time. We just have to be really good at what we are good at! There is great strength in the right mix of strengths.

Hire for your weakness

Some of the world's best inventors were known to be weak at certain things. Mark Zuckerberg and Steve Jobs didn't become famous for their tolerance of others.

Yet **weaknesses often make us uncomfortable** and this tendency to want to be 'perfect' spills over into our leadership style. We look at weaknesses during annual performance appraisals and how to improve these. We come up with 'development plans' focused on improving our 'blind spots'.

In reality, **we should be hiring for our weaknesses** , not improving them. If you're great at meeting with new clients to seal the deal but poor at the follow-up paperwork, you don't need a course in administration. You need an effective personal assistant. If you're a whizz at designing new processes but get bored with implementing them, you don't need a course in follow through. You need a project manager.

Going forward, companies who **embrace a diverse workforce** with **complementary strengths** will be better equipped to compete than those who demand conformity.

Be prepared to be challenged

Warren Bennis, an early pioneer in the field of leadership studies, wrote in his book 'Co-Leaders' that today's world is complicated and that the days of solo leadership are gone. In other words – autocracies are out – teams of leaders are in. Bennis believes that in today's complicated business environment, **leaders who can combine the skills of their followers will progress**.

The prerequisite to this ability is a leader who isn't intimidated by difference or uncomfortable with being challenged. Surrounding ourselves with those who always agree with us dramatically increases our likelihood of being wrong or failing.

What's your signature?

Richard Branson has made a career out of challenging the status quo. He infiltrates businesses that have become 'lazy' and brings unconventional thinking to business conundrums in order to awaken potential. He is good at competing and disrupts traditional thinkers in his space. His signature style is a 'rebel brand'.

Estée Lauder, of the cosmetic giant by the same name, built her success through sheer hard work and her signature 'I don't take no for an answer' courage. "To sell a cream, you sold a dream," said Lauder – and it was a dream she worked on in her tiny flat day in and day out, knocking on doors for hours on end to peddle her wares before securing contracts.

She became famous for saying: "I never dreamed about success. I worked for it."

But what if you aren't an Estee Lauder... a Branson... a Jobs... or a Zuckerberg? One of the non-negotiable skills that leaders should have is an ability to manage outcomes – but let's not forget: there are several thousand ways to get there. An authentic leader, who has found their signature style and is focusing on their strengths, is far more powerful than emulating tried and tested leadership principles.

In 2017, isn't it time we threw away the formulaic blueprint of leadership or what a successful employee 'should' look like? What businesses today need are leaders courageous enough to advocate for a diverse workforce who are unleashed to work on their strengths. Forget the New Year's resolution and improving what might never be. Each of us has enough strengths to contribute to the table already – what's yours?

WHAT CAN BIG BUSINESS LEARN FROM BEES?

Cormac Farrell

We are not the first generation to buck against the concept of conformity and collective allegiances. The idea of unanimity has offended the intelligentsia and sparked hearty debate in the political, social and arts arenas of every decade. In Monty Python's famous 1979 satirical comedy, The Life of Brian, Graham Chapman (cast as Brian) reiterates the point: "You're all individuals!" he shouts, to which they reply in unison, "Yes, we are all individuals!" "You're all different!" Their reply: "Yes, we are all different!" The irony is not lost on anyone when a lone voice squeaks from the crowd, "I'm not", and is quickly hushed.

Monty Python, masters of satire and hyperbole, were not the only people in Hollywood to spotlight the sore points of conformance. Star Trek had a go at it too, presenting the antagonists as a fictional alien race (known as 'the Borg') that lives and acts as a single organism under the mind-numbing control of a tyrannical queen.

Less humorously, but no less conspicuously than The Life of Brian, Star Trek seems to punt the same message: break free from the imprisonment of collective compliance, or risk a slow and subtle death. Particularly these days, the notion of individualism rises as the ultimate "-ism" above all other "-isms" to rule and reign over the millennial landscape. Concepts like 'job loyalty', 'anonymity' and 'group think' don't fare well among a generation, who were raised on selfies and arranged their own Uber rides to soccer games. Chapman's declaration, "You are all different!" sits far more comfortably with the current workforce.

As such, a beehive, the epitome of 'copy, paste workers', may not be the most popular analogy for how to build successful, resilient organisations. Nothing about the connotations associated with the words, 'group', 'worker bees' or 'dominant queen' appeals to today's workforce. But in reality, business and leaders of industry can learn profound lessons from the symbiotic dynamics of the hive. Given the environmental challenges facing a burgeoning population (i.e. us), we can't afford to think any way other than collectively into the future if we are to 'cure' some of our most wicked problems.

It's all about the buzz

In the beehive, the queen occupies the C-Suite but, at the same time, she is not the sum total of a healthy hive's success. It takes every worker bee functioning purposefully and collaboratively to make the multidimensional operations of a beehive flow.

The same dynamic is at play within the office. A **2017 McKinsey study on "The people power of transformations"** shows that transformation can only take place when employees buy in at every level, communication is consistent and **better people strategies are employed**. The survey concludes that strong CEO leadership is needed, but it's not everything.

True transformation requires an across-the-board **sense of ownership and responsibility among all people** representing the organisation. The CEO and C-Suite have to pitch a message that is clear and conducive for company buy-in. There must be a 'why?' attached to it – a higher purpose for the corporate mission that pulls the organisation out of survivalism and into success.

Managing the 'mood' of the hive

In a hive, the role of the queen is indispensable. Although she does not call the shots, she determines the general 'mood' of the hive by emitting a pheromone that affirms all is well. If ever her scent dries up, the colony becomes tense and springs into action to create a new queen.

Good leadership also tends to the 'scent' of the workplace. CEOs and C-Suite occupants are responsible for **setting the organisation's culture**. They need to ask themselves and their people continually, 'Are we nurturing a spirit of innovation? Do the systems and relationships we oversee make people want to come to work every day?' As the culture of an effective corporation strengthens, the executive must move away from punctilious control, more towards mentorship. Strong leaders safeguard vision at the expense of perfection and learn how to wield conductor batons over cracking whips.

Tending to the hive

Any beekeeper knows that to ensure a happy beehive, you have to keep investing in your bees. Multiple external factors, like temperature, humidity and air quality, can negatively impact on the productivity and resilience of a hive. Beekeepers often install sensors in their hives to track these influences and, through infrared analytics, monitor key elements of bee movement such as swarming and the queen's performance. As detrimental conditions arise, changes are made immediately.

In the same way, leaders need to serve their human 'worker bees' by making changes when necessary to foster healthy workplaces. McKinsey notes that when companies seeking transformation invest in robust 'people strategies' that include all levels of organisation, the change effort is 5.8 times more likely to be successful. Employees want to be shown, not told, and to have their voices heard and contributions noted. Companies that **use creative, more digital approaches** to engaging employees tend to benefit in

the long run, as talents are honed and changes are constantly made to build cultures of inclusion.

Eyes wide open

Like the bee, which is drawn to light and patterns indiscernible to the human eye, great leaders see what others fail to see. A bee's compound eyes work together to identify resources rich enough to sustain an entire colony. So too, leaders need to have their eyes everywhere to stay ahead. These days, social media can act as these eyes, scouting the landscape for new places to 'land'.

Younger CEOs are breaking the **norms of social media usage in their ranks** by actively pursuing a media agenda. These network services build a buzz and generate brand awareness. But beyond giving companies a competitive edge, social media effectively provides a platform to pioneer thought leadership and learn from what others in the industry are doing. Entrepreneurs like Bill Gates and Elon Musk engage with colleagues, competitors and journalists alike to expand their knowledge and stay on top of what is trending. Leaders who climb down from their towers and stay accessible to the company and customers can sidestep crisis before it even happens, because they know their people and the predominant culture in which they operate.

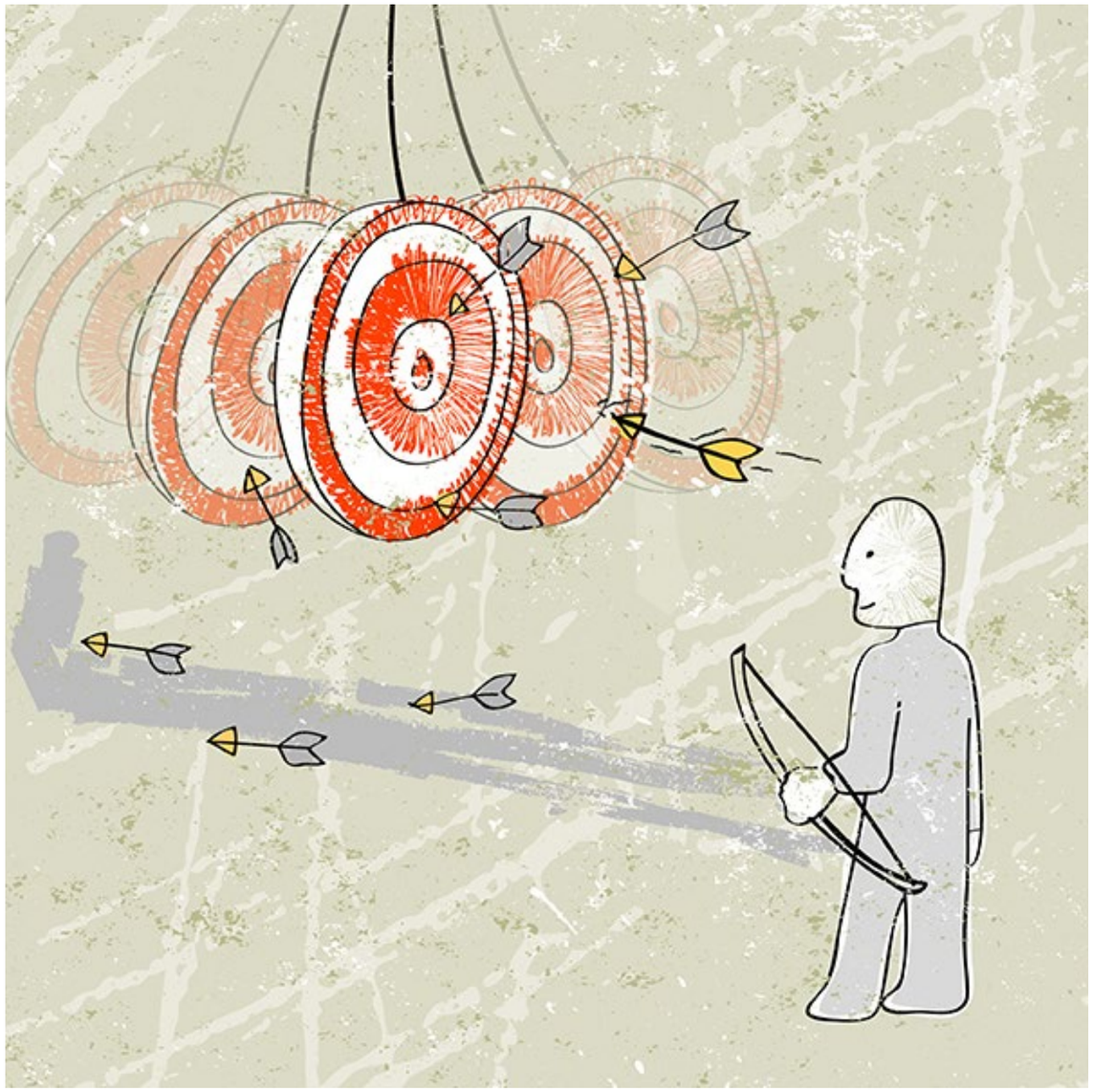
Don't get us wrong – when it comes to humanity, anything less than 7-billion extraordinarily unique people is a description that's fallen gravely short. We are all different, and **our future will hang on our diversity**. But, if we are to buffer a tumultuous future, we are going to have to harmonise our individuality.

Nature will tell us that we as individuals haven't worried about the cumulative effect of just throwing away our waste (rather than recycling it). We have created congestion, one car after the other. We have added to climate change one gas guzzler after the next. The efforts of only a few to reuse and recycle, to cycle or walk to work, to install PV cells, etc. will only go so far. The only way to solve the issues that we face is by acting in unison, as a hive or a collective.

Bees seem to have a winning formula for cooperative living – one that continues to thrive. It's time that we pay some respect, pay attention and learn from what they do. In a time when individuality reigns supreme, maybe minding our own bee's wax isn't the best way to go after all.

LOSING SUCKS!

Julieanne Saxty



Losing sucks! No one knows this better than Samsung, whose Galaxy Note7 Smartphone proved more useful as a hand grenade than a mobile device. When even replacement Note7s had loyal customers running for the fire extinguisher, Samsung recalled its flagship product at a choking cost of $20 billion in market value. It was a blow to the brand of epic proportions. And though rumours have it that a superior successor is on its way, the company will have to wipe the remaining egg on face and cross fingers that its Galaxy 8 launch will have learnt from the fail and go off with the right kind of 'bang'.

Nobody likes to lose. Especially these days. **Disruption** moves like a tremendous shape shifter through our businesses and organisations, continually changing the stakes and redefining the rules. Endlessly and untiringly, we need to find new solutions and technologies to keep up with the game and unburden people's lives. And so the stakes climb and the margin for error seems to narrow in. It seems now, more than ever, we cannot afford to mess it up.

But in our goal to be sleek and seamless, we forget what our parents (hopefully) taught us: success is not everything. Pixar's president, **Ed Catmull**, said: "Mistakes... are an inevitable consequence of doing something new ...and should be seen as valuable."

If you're not failing, you are not learning. Author Kathryn Schulz puts it this way: "Of all the things we are wrong about, this idea of error might well top the list. It is our meta-mistake: We are wrong about what it means to be wrong. Far from being a sign of intellectual inferiority, the capacity to err is crucial to human cognition." Ironically, if we want to 'get it right' we are going to have to get it wrong.

A recent **Harvard Business Review article** would suggest that it's possible to profit from failure. Taken a step further, it might even be a **catalyst for success**. There is immense value to be had in asking your customers to "please break this – please pull it apart – try your best"; and if they do 'break' the idea, then celebrate that you didn't bring a dud to the market.

Success is a lousy teacher

Success is a lousy teacher. It seduces smart people into thinking they can't lose.When the world's richest man recommends failure as a friend, we should all shoulder up to listen. "Success is a lousy teacher," says Microsoft co-founder Bill Gates. "It seduces smart people into thinking they can't lose." The US$72-billionaire began his career with a **titanic flop called Traf-O-Data** – a device meant to read the roads and analyse data for traffic engineers. But when he and business partner, Paul Allen, tried to sell the product to the local County, the prototype wouldn't even work.

In spite of the setback, Allen saw it as 'seminal in preparing us to make Microsoft's first product a couple of years later.' Failure gave feedback and insight to build on a more solid and informed foundation. Who knows? Maybe the mighty Microsoft would never have materialised without the small fry Traf-O-Data to teach them a lesson or two.

Bad sells can still be great ideas

Just because it doesn't sell doesn't mean you failed. It may just be that your idea is ahead of its time. Look at the 90's WebTV as a case in point. A brainchild of Steve Perlman, this smart TV was the first of its kind that aimed to make television and the internet an integrated experience. The idea was promising, but the infrastructure was less than optimal. At the time, modems were slow; websites were unresponsive to some devices; and broadband wasn't widely available. In spite of the hype, WebTV was just not able to attract consumers.

But, as the world now knows, **WebTV** was by no means a bust. In 1996, Microsoft bought out the product and changed its name to MSN TV, catalysing the complete transformation of the entertainment and gaming industry to what it is today.

The old saying "being early is the same as being wrong" may have a point. But it can be short-sighted as well. If markets are not ripe and ready for product, a before-its-time idea can be genially positioned to observe, tweak, and wait out the tide. A good idea turns heads, but **a great idea, honed and tested over time**, will create a vacuum that eventually draws in consumers and markets.

Fail fast, fail cheap, start again

Accepting failures as learning experiences does not give businesses the licence to be reckless or spontaneous. Quite the contrary, it helps businesses to count the cost and weigh the options wisely of the risk before innovating outside the lines. Author and Eureka! Ranch CEO **Doug Hall** says, "The development of a successful new product, service, or business is often the result of lots of learning from lots of failures. The key is to fail fast and fail cheap."

The classic mindset is to bring a business plan to 95% completion before taking action. Hall recommends taking the idea to 50% of its life form, with cheap, basic prototypes for marketing and testing.

> "THE MATH OF FAIL FAST AND FAIL CHEAP IS SIMPLE," HE SAYS. "IF IT TAKES SIX MONTHS AND $100,000 TO TAKE A PRODUCT FROM IDEA TO CUSTOMER REACTION, THEN AT BEST YOU'LL GET TWO CYCLES IN A YEAR. HOWEVER, IF YOU CAN DO A COMPLETE CYCLE OF LEARNING IN A WEEK FOR $1000, YOU CAN GET 52 CYCLES IN A YEAR AT ABOUT HALF THE COST."

For professionals such as engineers, whose miscalculations can rack up irrevocable damage, this type of 'playful' testing in the backend of the **design process** is imperative. Models and 3D simulations are our safety nets; without this layer of protective trial and error, we could venture into dangerous and unsustainable territory. Engineers have to embrace failure before they stumble upon success. Thankfully, people like Doug Hall teach us how to do it well.

The world is now risky, unpredictable, and hypersonic. Within this context, leaders need to deliver front-footedly, with a little mud on their face from falling from time to time. The only fear worth holding onto in this journey is the fear of fearing to fail along the way.

NEWS BULLETIN: IT'S NOT ALL ABOUT YOU

John McGuire

"WE LIVE IN EXTRAORDINARY TIMES. YOU KNOW THAT THE FUTURE IS GETTING MORE UNCERTAIN WHEN THE INTERNATIONAL MONETARY FUND PREDICTED STABLE ECONOMIC GROWTH JUST MONTHS BEFORE THE GLOBAL FINANCIAL CRISIS OR, WHEN THE MOST RESPECTED VOTER POLLS AND JOURNALISTS GET ELECTION RESULTS 100% WRONG. HOW CAN ORGANISATIONS PLAN EFFECTIVELY WHEN MACROECONOMIC CONDITIONS CHANGE OVERNIGHT BY AN UNEXPECTED ELECTION RESULT, AND MARKET SENTIMENT IS IN A CONSTANT STATE OF THE JITTERS EVEN BEFORE WE START CONSIDERING THE IMPACT OF EXPONENTIAL TECHNOLOGIES?"

We live in wild times. Either companies are clinging white knuckled to the steering wheel, or they're looking back at yesterday's inventions with a constant state of whiplash. Technology is moving fast, and **Marc Andreessen**'s words are still true: software is indeed still eating the world. A generation of technology is now seen in one year, and that rate of overtaking will only speed up exponentially over the next decade. Competition could not be fiercer, and risks lurk around every bend.

Naturally, this frenetic pace of innovation affects the way we build our companies as well. Job loyalty is not high on the millennial agenda, as the **stats** keep reminding us. In fact, 41% of **millennials** plan to make a move after two years working in their current job. Opportunity is knocking all the time in this digitally connected world and the 'office' has taken on many unconventional forms. Benefits once viewed as bonuses are now essential to employee retention, such as career progression opportunities, training and development, and a good work-life balance.

Essentially, that century-old assumption that we need the job is turning on its head. The new message is, the job needs you. Today, if you are good at what you do and if you are innovative, then it is highly likely that there are a wide variety of options out there for you... what organisation does not want an innovator in their attempt to be seen as innovative themselves?

And on the backdrop of this new paradigm is the niggly little truth that building a company takes time and it takes commitment. It takes years of effort and behind-the-scenes investment, along with **gutsy and talented employees**, to see an organisation succeed. A product's speed to market may have been fast and nimble, but the company that won that corporate advantage put in the back-end hours.

If you want to build a strong business you'll have to go beyond the question, 'What's in this just for me?' That truth will never stop trending.

You can't have your Intellectual Property (IP) cake and eat it too

These days, we hear it said so often, "Why should I give my ideas over to you? When the start-up down the street can pay me double and give me the kudos for my contribution, why should I even think about offering up my IP?" On one hand, it's a valid question. On the other, it's a bit naive.

The journey between a good idea becoming a great one and then making its way down along the monetisation funnel through hurdles of prototyping, testing, user market analysis, risk analysis, failure analysis, production scheduling, distribution mechanism, advertising, marketing and sales, just to name a few, let alone funding and capital raising, is a long and arduous one.

The notion of generating great ideas and then, hey presto, out pops a multibillion dollar industry is a nice one but more than a little romanticised. This is particularly so, according to leading academic Prof. Roberto Verganti in his new book ***Overcrowded***: in a world where coming up with an idea is not the problem, it is coming up with an idea that is meaningful and breaks through the 'noise' of thousands of ideas.

As Verganti puts it, we were blinded in the darkness searching for the bright light of a great idea (the proverbial innovation light-bulb moment) but now we are blinded by the light in a world awash with ideas.

There's also a whole lot of risk that can cost you millions when things go wrong. Just ask pharmaceutical giant Merck who, in 2004, had to **recall their painkiller** Vioxx off the shelves, coughing up US$950 million as settlement for the irreparable loss or damage to lives caused. The obvious question here is, if you want the IP, will you be willing and able to absorb the liability as well? You can't gorge on the benefits without eating the risks.

So, that may be the Harvey Specter way of looking at the argument short, sweet and rather cold.

But there's a more grown-up way of seeing it too.

Self-seeking behaviour is short-sighted

A company is a lot like any organism. It works well when all parts are contributing to the best of their ability, according to their innate function and purpose to the whole. On a microscopic level, it's a constant story of 'give and take' that breeds life and fuels motion. And the healthier your cells within the body, the greater chance of fending off disease and decay.

And the logic also applies to us. If the culture within an organisation inhibits **employees giving their best efforts** because their contributions are not being personally accredited, how can the business function at its best? It would just be a matter of time before terminal decline sets in. Not good for the company and not good for the employees.

Taken to the extreme, this kind of culture is toxic. If it is not curbed with strong, inspirational leadership that finds shared values and purposes, it runs the risk of ultimately destroying the organisation. The solution is a culture in which people are willing to open their fists and collaborate to keep the lifeline flowing and to see the higher purpose. As Todd McKinnon, CEO of **Okta**, says, "Give me five people who work together as a team, as opposed to the one person who's talented at everything. They're not, and it's not worth the trouble."

We all have to give a little

Organisational psychologist **Adam Grant** says that in every workplace there are three types of people: takers (what's in it for me?), givers (what's in it for you?) and matchers (what's the right thing to say, depending on who's watching?) In his **survey of over 30 000 people** across industries and nations, he found heaps of evidence to prove that when a strong giving behaviour is cultivated in a company, the whole company is better off.

When employees are empowered and comfortable to be more open-handed with their knowledge and skills, the more mentoring is provided, and the better an organisation does when it comes to higher profits, customer satisfaction, and employee retention even lower operating expenses. At the company level, when the predominant definition of success is more about contribution than about crushing the competition, companies have proven to do well.

Of course, a giving culture can't really be taught; it can only be caught. You'll never get a good thing going, where employees stop counting the cost, if leaders don't model it from the front. That's why future business might need to consider different ways of doing IP. While in some organisations, patents are seen as partnerships, where both the inventor and the company represented get the credit, increasingly the approach doesn't reflect the reality of a rapidly changing market.

Many start-ups offer shares in the company as a far better solution, which is a huge incentive for employees to keep innovating and implementing effectively. It communicates commitment and it kick-starts a culture where everyone is winning.

The sustainable winner may be the company but, in this case, it shares the winnings equitably with you.

Says Grant, "**Being a giver is not good for a 100-yard dash, but it's valuable in a marathon**." The question we need to keep asking ourselves is, which race do we want to run, and how do we want to run it?

NOT TICKING ANYONE OFF? THEN YOU JUST AREN'T TRYING HARD ENOUGH!

Adam Gifford

When was the last time you really offended someone at work? If you are a leader and your answer was 'never', you may want to rethink your job title. After all, American statesman and retired four-star general in the US Army Colin Powell had a point when he said, "being responsible sometimes means pissing people off."

Of course, we're not saying that if you're a jerk, you'll do great things. Quite the contrary. But we are suggesting the flip side of that equation – that if you're never willing to make unpopular choices, there is the possibility you won't do anything transformative in your career. Because let's face it, most meaningful achievements probably required a fight to get there.

The mark of a visionary leader is someone who's not swayed off track when thumbs up go swiftly south. Trying to remain popular can all too often stand in the way of being effective. If you want to leave a legacy, you have to be willing to take the heat. Otherwise, you'll never shape anything that can outlast the fads. It's the difference between taking people where they ought to go as compared to where they believe they want to go.

The majority doesn't have the best track record

Let's face it, the majority is often complacent. Looking down the halls of human history, many of our finest moments were forged in spite of the crowds and status quo. If it were a matter of conformance, the world would still be flat; women would still be unable to vote; and South Africa may have started a post-apartheid civil war. Liberation movements and step changes in business may be carried out by many, but they're almost always captained by the few. It takes a Joan of Arc and a Steve Jobs to go out swinging before others follow.

If you're too busy trying to get everyone to like your ideas, you'll probably end up cornering your product into a stalemate, or to the point of being impotent and ineffective. The more impact you have, the more alone you're likely to feel, because leadership requires a consistent stride in front.

On the flip side, leadership is also the ability to take people on the journey with you, even if it wasn't the place they thought they should go. This requires tough decisions, including confronting those who need to be confronted. Doing so will quickly differentiate your 'supporters' from those who are committed to a strategy and getting it done. 'Supporters' stand on the sidelines cheering whilst the committed ones do all of the work. Support is quicksand to organisational reform and far more insidious than dissent.

Know the conflict you're working with

Opposition is not a bad thing. Ticking people off is to be expected, if you want to leave a compelling footprint. But when dissension knocks on your door, you need to know what kind of conflict you're working with, and how best to tip the tension towards your greater advantage.

Within any organisation, bruised egos and brittle-boned loyalties to "the way it's always been done" are dangerous contenders. They're loud; they're disruptive, and you have to handle them with care. Often, the best way to handle them is to graciously ignore the bark, since the bite is bearable, and just keep going.

On the other hand, some conflict is your company's secret sauce – and you'd be rewarded by paying attention to it. You need to be able to ask the question, is this particular head but a handbrake or an opportunity? If it's the latter, use all of your EQ and resources available to transform these differences of opinion into creative tension that fuels the organisation forward. A good leader understands that there actually is an **"I" in team**. But, at the same time, the team only works best when divergent skills and personalities are given room to operate collaboratively, in a way that works best for them.

Turn your resistance into opportunity

In his **HBR article**, writer and Innovations Editor **Philip Auerswald** writes about how even the underdog can push back the onslaught of incumbent resistance and come out on top, by making the competition the enemy and your cause the venerable hero. As Auerswald put it, "The more disruptive your innovation, the more your success needs to look like the creation of a political movement."

Thankyou is a social enterprise that understands this concept pretty well. "We wanted to tackle a huge global problem (lack of clean water) with a huge global product, and the product to get us there was bottled water," says Daniel Flynn, its co-founder. "We felt the link was very important for customers: buying water and funding water, and buying food and funding food, and so on."

Ahead of a big meeting with Australian chainstore 7-Eleven, Thankyou went public and asked fans to jump onto 7-Eleven's wall and tell them that if they stocked Thankyou water, they'd buy it. The gamble worked and Thankyou water was on 7-Eleven shelves within weeks.

But to win over the bigger retail giants with similar food and body care products would take far more daring. In their **six-minute video** on YouTube, they told fans that they wanted to present to Coles and Woolies. It was viewed 80 000 times in two weeks. They also convinced donors to fund two **helicopters to fly around Coles and Woolworths' head offices** carrying a ten thousand square foot sign which read: "Dear Coles / Woolworths, Thankyou for changing the world! (if you say yes)". The rest, as they say, is history with the start-up having raised $2.5 million to give 150 000 people access to water, and 190 000 access to hygiene and sanitation, as well as 12.1 million days' worth of food aid in 16 countries in six and a half years.

Good leaders understand that ideas wait for no one, and when they come, it's our job to pull them down into reality. As designer **Charlie Wollberg says**, "If you don't bring that idea to life, it'll go out and inspire someone else. Because even if people like to wait, the ideas don't like to."

Get comfortable with being uncomfortable

In a constant world of disruptive overhaul, we need to sidle up to friction and get comfortable with critique. Ticking people off is not something to aim for, but it's often a vital part of moving forward – and will help reveal who you're moving forward with. The point is to accept that it's going to be a part of where you're headed. After all, if you're not ticking anyone off – perhaps you should be!

TO GET ANYWHERE IN 2018, YOU'LL NEED TO 'GET OVER YOURSELF'

Giam Swiegers

Sometimes, it's the simplest ideas that have the potential to make the largest impact. In this case, there are six simple little words we believe contain the missing links to the kinds of engaged and positive cultures we seek to build. When applied regularly, they're packed with game-changing possibility and can unlock regenerative powers.

You can even say them now with us. Ready?

"I don't have everything it takes."

There. Not so bad? In fact, this simple self-confession could become your organisational lifeline in 2018.

Today's best teams are learning that if you want to unlock creative genius, you'll have to learn the power of 'us'. In his book **Organizing Genius: The Secrets of Creative Collaboration**, author Warren Bennis puts it this way: "There are two ways of being creative one can sing or dance, or one can create an environment where singers and dancers can flourish."

If you can't do the first, you're off the hook; not everyone can hold a tune. But everyone, on the other hand, can cheer the singer on. Imagine a culture where **the audience in the shadows was as important** as the singer in the spotlight. If everyone operated in such a way that the other person was given the voluntary preference, what could that organisation not do?

"None of us is as smart as all of us," Bennis reminds us. In 2018, let's get smarter and get over ourselves, so that we can get on with the work of fixing the world, together.

So long, Lone Ranger

The human race has always had a thing for heroes. Our textbooks are peppered with tales of impervious, 'larger than life' leaders whose capacity always seems to be bigger than the adversity they face. We love the image of the Lone Ranger the leader à la Steve Jobs who rewrites the rulebook and smashes down the walls of status quo. Although we know no person is an island, leaders often act like one.

But in today's sophisticated and complex digital world, we can't afford to put the powerful few on pedestals and assign heroism to leadership (only). Our previous paradigms of the Great Man or Great Woman are simply insufficient to solve the challenges we face. "We'll need not great leaders alone, but great leaders who exist in a fertile relationship with a Great Group," says Bennis.

In a fluctuating disrupted business world where time is of the essence, we have no choice but to collaborate. There is simply more we can achieve when working together, with **each individual's talents activated and celebrated.**

It's been said, "**No matter how brilliant your mind or strategy, if you're playing a solo game, you'll always lose out to a team**." Teamwork is the stuff that can take a common set of people and produce uncommon results. And, given the **exponential rate at which innovation is cruising**, we desperately need our legacies to pave the uncommon.

There's strength in difference

We all want to build a "Great Group", governed by "**webs of voluntary, mutual responsibility**". We want to be masters of what we do, because we are passionate about why we do it. But, we'd do well to remember that true masters are not intimidated by divergent thinking. In fact, **diversity** is required to hone and develop your craft; unusual ideas (and the people who share them) are very, very necessary. Opportunities to be challenged even contradicted can fuel a more resilient and robust organisational culture.

The key to 'organising genius' is to start by believing there's genius among us and it's worth the cost to leverage it.

> MARGARET MEAD ONCE SAID, "NEVER DOUBT THAT A SMALL GROUP OF THOUGHTFUL, COMMITTED CITIZENS CAN CHANGE THE WORLD. INDEED, IT IS THE ONLY THING THAT EVER HAS."

Great ideas can't grow underground. We need to create platforms on which ideas can germinate and people can flourish in the light. We need to keep fostering unconventional thinking and encourage questions to be asked even if the answer never comes. People need to be given licence to think and dream and imagine, with a commitment from top leadership to talk less and listen more.

To make 2018 our most successful year yet, we will need to reflexively tuck into team mode and draw from the exceptional power of creative synchrony. Let's change our aspirations from 'I' to 'us' and see just what we cannot accomplish through this reformed perspective. It starts with me. But let's have it end with 'we'.

SHOULD BUSINESSES TOUGHEN UP? ASK AN ATHLETE

Jane Moran

An athlete's natural ability is one thing. The sheer grit, sweat and grind of the journey leading up to the pinnacle of achievement, quite another. Perhaps this is why psychologists have made careers of studying Olympians at the top of their game; and why 'elite sports' is a powerful metaphor for businesses wanting to win a 'gold medal' in performance.

Aurecon Olympian Jane Moran shares some uncommon truths about what winning bronze in water polo at the **2012 London Olympic Games** taught her about business imperatives.

Learning to lose before you win...
It sounds counter-intuitive, but sometimes our ability to lose is literally a defining factor in terms of setting us up for success. Rejection or disappointment in sport (and in business) is not a question of if, but when.

As water polo athletes, our team trained for years in order to bring home Gold. When we lost in the semi-final during extra time, eight years of dreaming about coming out on top came crashing down around us. Although a loss like that was emotionally draining, we couldn't afford to dwell on it. We took a decision to deal with our disappointment (thoroughly) later and focus first on the next battle – competing in the bronze medal play-off two days later, which we went on to win.

Roger Martin, former Dean of the Rotman School of Management who wrote Playing to Win: How Strategy Really Works, explains that to win, you must have a mindset of playing to win. In our case, we were not simply 'playing to play'. It was a 'playing to win' mindset, despite a great setback, that saw us take home that bronze medal.

Playing to your strength isn't (always) the best strategy
A sports team comprises a mix of players. Some are forwards – those who spearhead a team's strategy and are on the 'frontline' of strategic play. Some are the defenders – they manage a crisis when the play goes wrong in order to fend off disaster. Some are strikers – those whose job it is to recognise opportunity and to act upon it to fast track success.

Although a team may have many natural forwards (or defenders or strikers), it's crucial to realise that sometimes, fulfilling the role you naturally gravitate toward isn't what's best for the team or its playbook. A team of only forwards or defenders or strikers would result in certain defeat. It has taken time, but our team is now able to operate like a well-oiled machine because we've agreed what roles are best for our strategy, and agreed which of them each of us will play, egos aside.

Similarly, Roger Martin asks in his book a very powerful question about capabilities: "What capabilities must be in place to win?" Sometimes, emulating these capabilities is what's needed to succeed.

There isn't always time for 'good' communication
At the beginning of our journey as a team, it became clear that we needed team members who were great at giving short, sharp commands in the pool; and team members who were good at listening to these. Too often, we 'listen' through filters such as: "Why are you telling me what to do?" and "I know better!"

Within a pressured, high-performance environment, it's crucial to understand that when the pressure is on, there's generally little time for stroking egos and niceties. It makes a lot of sense to reduce instructions from sentences to a few words in time-constrained situations. Delivering such instructions was a learning curve, and receiving them an even greater one.

Management theorist Simon Sinek likens this, in business, to creating an environment of unwavering trust and cooperation. He advocates for the kind of environment in which you believe that if you were to go to war as a team, your comrade would save you; and you would do the same for them. This notion of teamwork transcends the common definition of the word 'team' that we use so loosely in business.

Teamwork is an individual sport
It may sound selfish, but focusing on yourself is sometimes the best thing you can do for your team. A winning team has, at its core, individuals who must repeatedly ensure they are at their peak to ensure both their selection for a team, as well as team success. If each member focused individually on improving themselves on a continuous basis, or what we call the 1 percenters, the sum of these improvements may be enough to ensure that team scores the winning goal during a really close match.

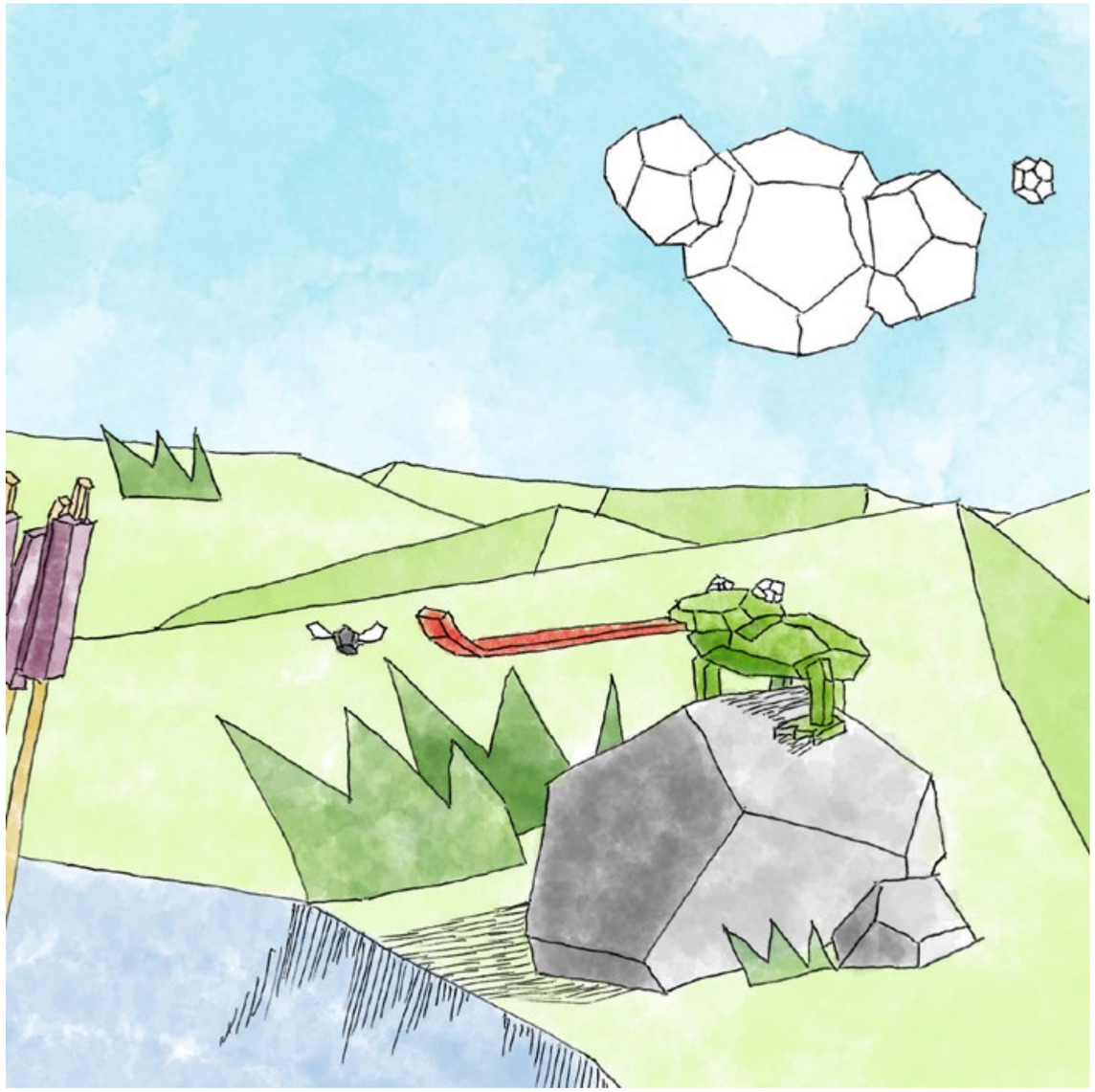
In our case, we took Bronze during the dying moments against Hungary. While this was a team effort, it was also a culmination of individuals at the very peak of their skill set, and can be attributed to the individuals improving 1 per cent every time we trained, spoke or thought 'water polo'. At the Olympic Games, every team is great and the team that is a percentage better than the rest will be victorious.

In the business world, we've been inundated with the notion of collaboration. However, the Harvard Business Review article Collaborative overload cautions strongly against ignoring this wisdom, saying: "Soon helpful employees become institutional bottlenecks: Work doesn't progress until they've weighed in." The fact is that teamwork can energize or exhaust. 'Me' time is crucial; and a continuous desire to improve oneself is an important attribute of leaders if they are to keep on performing well in a team environment.

While it's easy to draw comparisons to the dedication and time that winning takes, it's often the unrecognised truths that have the power to make the greatest impact. Next time your team's performance declines, it may be worth asking if you are good at 'losing'; if you're willing to fulfil a role other than the one you're naturally good at; if you should forget 'being nice'; or if being 'selfish' is called for...If you want to win at work, Roger Martin might say: "then play to win!"

LEAPFROGGING: HAS BUSINESS BECOME TOO LAZY TO INNOVATE?

Abbas Jamie



The concept of 'leapfrogging' – or the idea that by embracing modern systems, poorly developed areas can develop rapidly without the need to go through intermediary steps – has captured imaginations. With leapfrogging, new ways of thinking rapidly lead to new ways of doing and being – and new ways of competing. We know that we can apply new technology to less developed regions with great success. But what of the opposite? If innovation trickles down, can it also trickle up? While developing countries may be prime candidates for leapfrogging technologies they are also rich potential sources for reverse innovation.

The massive successes of mobile networks in Africa transformed one of the world's least connected places into the epicentre of a communications earthquake. This 'leapfrog' overcame problems such as "no line infrastructure!", "limited electricity networks!", and "a population mostly without bank accounts!" How? Quite quickly, beyond all original forecasts, with cheap handsets, mobile base stations and unique prepayment packages.

When we think about leapfrogging, we often think about superimposing a cutting-edge technology on a market that is underdeveloped. Leapfrogging leads to solutions that can allow you to completely overtake your competition, despite the fact that they are better established, with bigger infrastructure and more resources. But does leapfrogging only work in one direction?

Leap in reverse

In Africa, adversity is a powerful driver of innovation. When you absolutely have to; when you have no other option; when your back is up against the wall – then true innovation comes to the fore. This is often referred to as 'survival' in developing nations, but is there a lesson in this for developed nations?

Will alternative energy solutions, specifically on the African continent, become a major disruptor? In the not too distant future, we could see people across the African continent plugging in their electric vehicles to power their green homes. Combining solar energy with electric power from vehicles, houses could be completely off grid. Each house would produce its own energy which could be transferred across town by an electric vehicle.

Can you imagine the apps that could be dreamt up on the back of this scenario? This in turn will impact on how their cities plan for energy generation in the future – in the absence of the massive energy infrastructure presently powering developed cities across the world.

Cities in the developing world will be looking to the 'new cities' to see how to transform their existing centralised energy generation model to catch up with the developing world.

Technology and innovation companies in the developing world will be playing a major role in these new futures.

There is a saying in Africa: "It is not the big that eat the small; it is the fast who eat the slow!" Should corporations and political leaders alike recreate the conditions of adversity to hasten innovation? Should businesses use this as a corporate strategy – i.e. ask its workforce in developing countries to find disruptors?

Perhaps we should be looking to the shanty towns for the next design innovators? If we apply this kind of innovation to developed economies, reverse innovation may just have the power to disrupt even our most innovative competition.

WHY WEARING YOUR HEART ON YOUR SLEEVE IS THE RIGHT THING TO DO

Georgina Mahony

The classic corporate leader image is steely, guarded, unflinching. Focused on business performance and outputs, with no need to delve deeper into personal interaction with their team members. However, studies are finding that a traditional, one-dimensional approach to leadership is detrimental. A new business paradigm is needed altogether.

How often have we heard it said, "They wear their heart on their sleeve"? In some settings this can be a compliment. But let's be honest, in the work context, particularly in industries such as engineering, it's often said as a criticism.

Research (and experience) suggest that emotional intelligence, more than skills and education, ranks top of the list in predicating career success. Corporate cultures that are cognisant of the affective values which govern an organisation's emotional culture build companies that can buffer radical change with reinvention, led by employees who love their jobs and tend to stick around for longer.

Leaders who consciously craft unconscious elements of organisational culture and prioritise "softer" areas like high engagement, empathy and trust are currently reaping the rewards. Here is why we recommend that leaders hang up their jackets and expose that heart pinned to their sleeves.

Showing your true colours

The world of work today is a moving target. Just when one company gains the home ground advantage, the rules of the game are again disrupted and redirected. Markets are continually morphing with new technologies and accelerated delivery demands with resultant need for change in strategies for leadership, talent, and human resources.

Technology has turned corporate walls into glass doors; with the tap of a screen people can see deeply into an organisation (and its leaders and values) and choose if they want to be a part of it. As work demands increase, Millennials and Gen Xers are expecting blurred edges when it comes to organisational structure and solid lines when it comes to character, transparency and engaging with their teams.

In its 2015 Global Human Capital Trends report, Deloitte notes, "The balance of power in the employer-employee relationship has shifted — making today's employees more like customers or partners than subordinates." That's why it was no surprise to see 'culture and engagement' rank highest amongst 2015's top ten trending themes and the people recognising it as a "very important issue" practically doubling in a year, from 26% to 50%.

Organisations are essentially waking up to a big idea. "Naked" organisations – authentic, exposed with nothing to hide – will hallmark our future economies. Far more than our products and services, the values which drive them are laid bare for critical review. If we ignore these traits and fail to address the Hows? of our operations and culture – how we lead, how we develop and how we inspire people – we will go the way of the dinosaurs.

The power of trust

Trust is the game changer that tips bottom-line-based organisations into positive and meaningful places of work. Though traditionally viewed as a 'soft' and immeasurable quality, trust throws down some hard evidence to argue otherwise. Through a neurological study on the relationship between trust and economic performance, Paul Zak compares people in high-trust companies with those in low-trust companies and finds: 74% less stress, 106% more energy at work, 50% higher productivity, 13% fewer sick days, 76% more engagement, 29% more satisfaction with their lives, 40% less burnout.

Extending trust is about opening channels – channels of authority, autonomy and communication. A **2014 Citigroup and LinkedIn survey** backs the idea that loosening the leash and giving colleagues space to run is empowering: nearly half of employees say they would give up a 20% raise for greater control over how they work.

In another **study conducted by Gallup in 2015**, 2.5 million manager-led teams in 195 countries saw improvements to workforce engagement when supervisors reported directly and daily to them. And Jim Whitehurst, CEO of open-source software maker Red Hat, found that small, honest gestures, like asking for help, "had the opposite effect than he [I] would have thought. It helped build credibility."

This employee-centric approach rallies greater collaboration, participation and productivity. Innovation naturally is born, because people are given the space to create and they feel 'believed in'. Through verbal and non-verbal trust elements of organisational culture, workers are encouraged, even challenged, to invent beyond the ones who outrank them.

Measuring immeasurables

Some companies (though, sadly, still the minority) have moved beyond tokenism and intentionally invested in their emotional cultures, which in turn has generated very positive results. Emotions like joy, fun and excitement drive productivity and healthy competition (and just make work a really fun place to be, considering how much of the time we are there!). Rob Katz, CEO of Vail Resorts, for instance, has picked up on the

galvanising power of joy to unite company ranks, foster hospitality and retain top talent. Everything from outings to rewards to on-the-job behaviour must encapsulate the company mission to "go out there and have fun". So when 250 executives and employees take on the Ice Bucket Challenge, or a ski lift attendant spontaneously breaks out into song, there is a culture at play that just makes intuitive sense.

Shouldn't we take playfulness more seriously in our own industry? Imagine Project KRA (Key Results Areas) not based on an employee's 'engagement scores' but on 'heart leadership'. Accreditation systems that go beyond measuring compliance to target indicators such as project team inclusivity – teams taking deep pride in their '5-heart rating'. Quantifiable data that credits our performance when we engage in valuable or impactful conversations with our colleagues.

As organisations, we need to remember the only way to drive an open and authentic culture is by the leaders we promote, the values they hold and the behaviours they display.

Values are caught, not taught, and leaders must lead by example. If we want to build businesses that brave the times, we have to exchange our 'general and soldier' methodologies for more honest and unpretentious processes that build organisational culture from the inside out – beginning with ourselves.

MANAGEMENT IS DEAD: IT'S TIME TO LEAD

Kate Yoxall

When Nicolaus Copernicus proved in the 16th century that the earth actually revolved around the sun, he did more than inflict a breathtaking blow to the human ego. He threw a new paradigm into the atmosphere. Soon brows began to furl with questions around the way that society was configured; if the earth itself was not the centre of the universe, then what other so-called divine doctrines of institutional authority rendered review?

Suddenly the same old pills around the supremacy of kings, queens and popes didn't go down as smoothly; the world began to wake up and see the possibility of something far more inclusive and empowering.

Similarly, within the business world a **Copernican revolution** is underway. Those at the top are not necessarily the central source to which workers are gravitationally pulled. Quite the contrary, those traditionally on the fringes are moving to the organisation's centre and new workplace dynamics are interrupting historical rules of engagement.

The future workforce is becoming more a case of 'skills on tap', collaborating across corporate lines to cull interdisciplinary knowledge. All of this is dumping traditional management structures into a serious identity crisis, leaving the question to hang in the air, 'who deserves to lead us from here?'

The emphasis needs to sway from top down management to leadership. If we want our organisational structures to overcome their innovative inertia and breed break-out thinking, we need to **focus on collaboration** over control, casting direction over cementing hierarchies. Managers as we know them, are dying. Our problem is that many don't know it yet, and those that do are in self-preservation mode and trying to hold down/hold back the next generation. In doing so, they risk bringing down the organisation that they are trying to manage.

An enemy to innovation

What words tend to go hand in hand with the concept of 'management?' Archaic? Stale? Stifling, perhaps? Management conjures up images of pointed fingers over cubicle rows – scores of anonymous employees under the supervised eye of a superior. The classic picture of a factory line is the appropriate context in which the concept finds its roots. With the rise of the industrial revolution came the demand for streamlined, scalable production of manufactured goods – standardised processes that relied on regulated workflows and quality control systems. Efficiency and consistency were the name of the game, and people were tossable commodities, in the effort to squeeze maximum outputs out of minimal inputs.

But today's economy is fuelled by knowledge flow, creativity and the ability to think. Ability and aptitude are no longer cut-and-paste credentials that require strict oversight; even those who are not classified as knowledge workers are required to make on-the-spot smart decisions that respond to rapidly changing business climate conditions. Organisational agility is now a company's bread and butter to survive a digitally disruptive world.

The reality is, in spite of the tremendous need for flexibility, organisations are still suffering from managerial arthritis. Traditional management styles foster hierarchy and division of labour, and knowledge is clustered and contained under the collective banner of 'social capital'. All of it is incomprehensible to the current language of collaboration and knowledge sharing.

With systems still stuck in a 19th century industrial mindset, there's no room for relationships of trust and cooperation to develop. There's no opportunity to butt heads, to add perspective, to panic well, and to push through together when bureaucracy keeps you in boxes.

A new leadership ethic

Managers have historically added the best value by ensuring their people stick to the rules. Rules, processes and procedures are needed (particularly in big companies) so as to avoid chaos and to ensure that each person knows their part in the play. This also enables a product (or service) to be repeated and a consistency of quality to be achieved.

Paradoxically, however, these same rules and procedures that underpin quality also limit creativity, innovation and exploration of the new. Large companies are fixated on rules and procedures, and then penalise hard anybody who breaks them. What they should be doing is finding ways to constantly upgrade their rules so that they constantly build a better product. Their rules and procedures need to be in a semi-rigid state of flux – not too rigid that they can never be changed, but not so loose that there is no consistency.

Managers hate this. They want consistency. They want the rules to be followed. They want order. The new leader is one who can understand the difference between rigid and semi-rigid, and the difference between flexible and non-existent. They can understand the notion of continuous improvement and continuous deployment, where those rules and procedures are constantly being upgraded by the people who are intended to follow them (because if they upgrade them themselves, then they are likely to follow them).

The architect-builder

Gary Hamel notes that if we're going to get serious about tackling our core organisational incompetencies, "We have to start by scrutinising the architecture and ideology of modern management — two topics that aren't often discussed in boardrooms or business schools." We have to reimagine a new type of leader that is both architect and ideologist; a reformer in both the tangible and intangible of today's unique animal known as innovative culture.

Lead with caution, controls and reams of red tape; and watch your ship go down. Celebrate mistakes, take risks and invite collaboration; and expect success. Today's organisational leaders must be able to envision this social ecosystem and then to build it, one solid and inclusive decision at a time.

The capacity to architect and articulate high performance spaces is one thing. The resourcefulness to implement them is another – instilling systems, rituals and processes, and promoting rich communication and continuous redesign along the way. Traditional management held lines of protocol and status quo, but current leadership demands a more nimble and pioneering business approach that is willing to unlearn for the sake of reinvention.

At the end of the day, a new leadership paradigm is in order. It is one that adds empathy to expertise and trades directives for dialogue. Whether this is a suggested upgrade to the concept of management, or an overhaul of the concept altogether, is still up for debate. But one thing is clear; radical change is needed. Otherwise, as Peter Drucker reminds us, "If leaders are unable to slough off yesterday, to abandon yesterday, they simply will not be able to create tomorrow."

WHEN IT COMES TO BUSINESS: SMALL IS THE NEW BIG

Carl Devereux

There's a new giant in our midst. Known as super competitors, these corporate colossi are breathtaking in size and scale, with cavernous footprints in market share and unprecedented merger-driven muscle power. So wide is their stride over the competition that, according to McKinsey Global Institute research, 10% of the world's public companies are gobbling up 80% of all profits today.

But the so-called 'armour' that outfits superstar companies can lead to crippling corporate inertia. As these companies grow, so too do the systems and processes needed to control them. These systems and processes invariably act as a quicksand that slows down their decision making. Even worse, it constrains their thinking to preserve what they have created, and risk taking is avoided.

In future, the bravado of management teams touting being the 'biggest and the best' might be code for the 'slowest and the most risk averse'. Does this mean the demise of the mega-corporation? Quite possibly, if they don't reposition themselves to think differently around how to win.

When it comes to business: small might literally be the new big!

When David challenges Goliath, David often wins!

Within large enterprises, change does not come easily. Decisions can take months, as they run their course through the chains of command and bear burdensome cost implications. Failing products are not easily pulled off the production line, and cracks in organisational culture take time – and a whole lot of undoing – to mend. Vehicles of this size make slow and wide turns, and it's never fun for anyone involved.

Smaller businesses, conversely, have speed on their side. Unlike their big counterparts, their lack of complexity allows for decisions to be made quickly and seamlessly. With low staff numbers and streamlined services, they facilitate quick turnarounds that respond aptly to market demands.

Tappsi, for example, has managed to disrupt the powerful traditional taxi industry of Latin American cities by offering an e-hailing mobile app that secures a safe and reliable experience within vulnerable urban settings. Launched in 2012, the company currently has over one million app users and over fifty thousand taxi drivers on their books.
The idea isn't new (insert Uber), but the ability to bring a mass-scale solution to this significant societal ill is. Going outside a cumbrous system but using its resources, Tappsi leveraged unconventional methods to infuse new value into a historically hamstrung industry. It didn't take a lot of cash and people to do it.

Growth isn't (necessarily) good

When they are challenged, the response from most large companies is to use their corporate muscle to 'muscle out' the competition: they try to drive down prices by buying power or offshoring; buy out the competitor (mergers and acquisitions); or create monopolies where they are the only service provider in the market. It gets worse when they become publicly listed. When they are on the stock exchange, they have to do what the market values, i.e. pursue these strategies aggressively to grow.

But by doing this, they are actually disconnecting themselves from their customers. Despite this massive growth, they are losing touch with their clientele's real needs and leaving the door open for another more nimble, agile smaller competitor to come in from below.

Staying close to the ground

The inherent disadvantage to being at the top is that your ear is nowhere near to the ground. And though large corporations can perform studies or hire consultants to scope the land of buy-and-sell, small enterprises can achieve the same results in a fraction of the time by leveraging their client relationships. The ability to engage one-on-one with customers and clients enables small organisations to come up with relevant solutions to real-time problems in a way that large corporations cannot.

Backed by organisational agility, clients' on-the-ground insight can inspire small business to differentiate on products and services which add original value to the market. Their unique insight into customers' preferences and spending behaviours give them a one-up edge on what is needed and wanted, or even unanticipated, amongst consumers. And as such, they can move into that unoccupied space of the market and gain the competitive corner.

So, what then should big companies do? If they want to keep on winning, they'll need to learn to 'cannibalise' themselves. They'll have to cultivate a culture which 'eats' its own businesses – meaning they will have to constantly divest themselves of services and products that they value highly today so as to enable the new to come through and to make room for focusing on what will be successful tomorrow. In other words, they'll disrupt themselves purposefully so that they don't get caught out following an unalterable course called status quo.

If large companies don't divest themselves of the services and products that they value highly, they'll never create the sense of urgency that drives successful start-ups, i.e. "We simply have to make something work, because if we don't, we won't survive." They'll

have to let go of that which they value the most to enable the new to get the focus and attention and oxygen it needs to be brought to life.

With disruption moving at a thunderous rate, those positioned to keep up with the pace are not necessarily the largest. Though dwarfed by the deep shadows of the superstars, small businesses are poised for success. Nimble, adaptable and able to align to overcome, small may just be the new big – and big business would do well to pay attention.

SHORT-TERM THINKING IS KILLING US IN THE LONG RUN

Quentin Jackson

Good news isn't written overnight. Headlines by nature may be heralding and immediate, but the back-end story is one of strategy, sweat and concerted effort over time. So, when the **World Wildlife Fund** announced the rise in wild tiger populations last year a notable feather in conservationists' caps that disrupted the endangered species' 100-year consecutive decline you've got to know some serious teamwork must have pulled off a scale-tipping feat of such proportions. The population upsurge was not the result of one or two heavy lifters, but the by-product of many hands carrying the load together.

When it comes to something as broad and ambiguous as sustained corporate success how do you rally small, conglomerate change? When the fruits of your efforts are less quantifiable than 690 additional cute and cuddly tiger cubs to the planet, how do you motivate boards, governments and corporate partners to invest in rewards they can't run their fingers through?

The fact is, **climate change** is currently eating away all facets of 'business as usual' and demanding a brave new breed of business that calculates the cost of ignorance. It's time that companies regard their own inertia as ticking time bombs and wake up to the urgency of sustainable investment. But for this to happen, we need to adopt a new narrative to motivate change.

The pandemic of short termism

Is our short-term thinking actually setting corporations up for a longer and more fatal fall? In the past decade, the **average tenure for a CEO in the corporate world has dropped** from 8.1 years to 6.3 years. In **Australia**, when you exclude the 'golden oldies' who hold more than 15 years' tenure, that average has dropped from 5.7 years to 3.5 years in just over a decade. And the average tenure of a company on the S&P 500 has gone from 33 years in 1965 to 20 years in 1990, to a predicted 14 years by 2026.

And if the **latest insight into S&P turnover** holds, about 50 per cent of the S&P 500 will be replaced over the next 10 years. The pace of change thunders like a Monday morning on the stock exchange, and even the cream of the corporate crop is struggling to keep up. In the midst of the turbulence, the message is clear: either perform wonders, and quickly, or there's the door.

Markets are disrupted these days faster than a toddler can learn to walk. In the same timeframe that leaders were historically given to find their feet, they're now expected to pull rabbits out of hats anticipating change in markets and offering new business model solutions that run ahead of **disruption**. And with so many breathing hot on your back, it's no wonder that CEOs are finding the door more frequently. In a culture of quick gains, who wouldn't succumb to short-term decisions that earn an easy buck or win popular votes?

Nonetheless, it begs the question, is our short-term thinking actually setting corporations up for a longer and more fatal fall? When the demand for 'perfect fit' results is so pressing, is it even possible to **step back and craft a different view that has the long term** in mind? It would be interesting to ask this question to the 79% of companies no longer flying their Fortune 500 colours since 1982. Odds are pretty good that their answer would be 'no'.

The price we all pay

What the majority of these dying stars failed to understand is that long-term corporate success and environmental responsibility can go hand in hand. But without a long-term scoping strategy, even the most formidable giants can fall when economic development and environmentalism are pitted as enemies, and not allies, in the relentless race towards market share.

Companies who shoot for short-term profitability are most probably counting their total return on assets, but not on resources. But with **water**, **energy** and other natural resources in limited supply, businesses have to monitor their consumption, as well as their paybacks, over time. Failing to count the cost has proven detrimental in the past, all the more for companies today who face a rising tide of volatility and disruption in their industry.

On the other hand, those companies that embed their corporate strategies with sustainability are finding its investment to be a powerful tool for reinvention in a world where resources and buying power are growing scarce. Businesses who see sustainability as more than just a tick box for corporate social responsibility, and as a sound financial strategy, are gaining a strong competitive edge in an ever-shifting economy.

For the sake of longevity of the errant organisation itself and for the sake of our future generations, corporate sustainable investment needs to become a compelling case of sheer profit, as well as social consciousness.

The argument for change

Of course, there is the argument of emotional economics. We've heard about the new breed of consumer, who is **willing to pay more** for products and services dedicated to doing

the planet right. Companies with a demonstrated commitment to sustainability and triple bottom line have found **profitability to go up**, not down, in the past few years. This sway towards socially conscious spending is fast becoming a reality – and one that businesses would do well to heed.

But the economics for motivating change can be even more convincing, if we look at authors Baghai, Coley and White's enduring ideas put forth in their book, The Alchemy of Growth. Dubbed the "three horizon framework", this approach offers companies a way to stay in the game for the long run, by tending to a three-fold corporate reality. On the first horizon, it's about doing what the brand does best to ensure a steady cash flow. On horizon two, it's about scoping future growth engines in current businesses and on horizon three, the company eye is on seeding options for the future.

And rather than assigning 'now, later, or much later' to these chronological realities, the key is in upholding all three simultaneously. While companies will always lean more heavily to the here-and-now of horizon one, it's equally important they keep imagining and probing the future in horizon three.

Taken a step further, it's also time for the 'CEOs of nations', i.e. political parties and leaders, to make this stick (given their limited tenure). Without their eyes up and ears down, they may just stay stuck in the same old holding patterns of short-term profitability, which is just a matter of time before it's a case of crash and burn.

We stand on the cusp of much that is unknown, with our feet on highly volatile ground. In so many senses of the word, business has never been this way before. Technology aside, the Goliath disruptor to our days will most certainly be climate change. Those companies and indeed nations who successfully find solutions for it, seeing resilient long-term environmental sustainability as a strategic advantage and not a lip service, will do themselves a great service. Inadvertently, they'll do the world one too.

THERE'S STILL MORE TO 'COURTING' CLIENTS THAN 'SWIPING RIGHT'!

Craig Adcock

Would you pop the big question to the special person in your life via an SMS text, tweet or Facebook? If you're hoping for a "yes!", then perhaps social media wouldn't be your number one choice. There are just some things that are better said in the flesh. And whilst in our new tech-savvy age some people are turning to social media to romance their other half, ironically the rate of breakups via text is rocketing.

Technology is fast-tracking relationships with 'instant access' and 'virtual conversations' – yet, in many instances, they don't last and there's a danger that social media may actually derail them. Could the same be said of business relationships? Technology may speed up the time it takes to 'dial up' – but let's not forget that it is the human touch, not touchscreen, that strengthens the relationship.

The 'dating game'

The world of online dating (can anyone say 'swipe right'?) sees many relationships formed, but their **long-term success is not always guaranteed.**

At the other end of the scale, the hugely successful **eHarmony** is an online dating website designed to match single men and women with each other for long-term relationships. This matching process is driven by eHarmony Labs, a relationship research facility based on sound psychology. And their formula is working.

The **divorce rate** of couples who met on eHarmony is just 3.86%, compared to the national U.S. average of 50% (American Psychological Association). The site has members in more than 150 countries, with large investors who back its success. The secret to its success? Finding deeper commonalities and shared interests between two people – i.e. eHarmony offers users the opportunity to find far more than just a 'hook up'. The aim is genuine connection.

Although the world of business and boardrooms is a far cry from red roses and romance, forming working relationships in a digitally connected business world is now more commonplace than ever. But in our haste to settle the 'transaction' – have we forgotten the person at the other side of the email? What happens when you find yourself working on a project with dozens of people, who work in various locations around the world, none of whom you're ever likely to meet? Should we be turning to eHarmony (and shying away from Tinder) for inspiration?

Using a more work-focused variant of eHarmony's psychology-based **29 dimensions of compatibility**, we might be able to work out the commonalities that can best shape our project teams of the future. And what's not to love about that?

That thing called trust

In the past, successful client relationships were largely built on trust. Perhaps two people met for the first time at a business function, decided there was enough 'common ground' to build enough trust to work together in future and then spent more time strengthening this relationship, which led to more work. All of which took place face-to-face, in physical environments, with a few phone calls in between to make sure the momentum of the relationship was never lost.

Today, we've turned that formula on its head. Transaction often precedes relationship. But as we spend more and more time using increasingly better virtual technology, we must ensure we build and maintain a certain level of trust with our clients and within our project teams – that is key.

Technology as progress or pain point really is within our control. We can have the **best of both worlds**, but we need to know how and **when to use the right tools**. Trust takes longer to gain than it does to lose, and is difficult to recover.

The human touch

Within minutes of meeting someone for the very first time you're usually able to find some common ground. This common ground is a safe place to build a human relationship and is also somewhere you can easily revisit when you need to re-engage with that relationship. The word **relate comes from the Latin relatus** meaning to carry back, which is exactly what we do in our relationships.

When we meet someone for the first time, we walk away from this human interaction and take away part of them (their personal stories and information) with us, which we remember to recall the next time we see, speak or write to them. It shows the other person that we understand and have empathy for them, and is the foundation of building a trusting relationship. In effect, trust creates a human efficiency that speeds up the way we interact with people on subsequent occasions because we know each other well enough to proceed without caution.

Doing away with the fax is one thing, but doing away with niceties is quite another. Trust takes time and effort, regardless of the speed of your internet. With virtual reality (VR) about to overtake virtual meetings and video conferencing, let's remember that seeing someone's hologram in a meeting isn't going to make them more trustworthy. That part is up to us.

Recognising that it's a choice

The future of client relationships is much like the future of all relationships. It's our own personal responsibility to stop and think about the best ways to solve the problem at hand and choose the right balance of human and digital solutions. This is a balancing act and will be different for each business interaction.

Yes, let's use our VR capabilities so that our clients can 'walk through' their new office building even before the first brick has been laid, but let's not get lazy about human interaction. Ditching our VR headsets for a couple of hours for a few drinks at that same building is just as important.

We can have the best of both worlds, but we still need to work at it.

Technology today often minimises the need for physical meetings and human interaction – sometimes eliminating it completely. People are often geographically remote, but still work on a project together. Our desire is for that same project to be successful – but let's not forget that underlying the endeavour is a high-performance project team of people who trust each other and work synergistically.

A headlong rush into offshoring and work-sharing can, just like in the world of online dating, end in broken hearts and mismatched expectations. Our challenge is realising the benefits of technology in a time-poor work environment balanced with building trust. In future, we'll have to work doubly hard on finding common values and building connections in our project teams in order to take our project relationships from a 'one-time date' to a 'happily ever after'.

WHAT DO COMIC BOOKS AND COMPLIANCE HAVE IN COMMON?

John Callaghan

You've won the bid to design a piece of infrastructure set to change how quickly commuters get to work. It's a major project and your designs are heralded as extraordinary. You can't wait to see the end product come to life…but wait you'll have to, and so will the city!

The design development and approval procedures with their changes, recommendations and then further compliance reviews, changes and recommendations is a spaghetti bowl of processes that despite the project's purpose is everything but quick. Sound familiar?

We want to ensure excellence and accountability, yet all these checkpoints, wrapped up in **complex and challenging contractual and commercial frameworks** can end up making one big rabbit hole – complicated and congested at best. In today's complex world of procurement, it seems at times we can build a bridge quicker than we can design one.

On the flip side, given our species' track record of environmental flagrancy and the ever increasing loss of business trust, someone has to be the gatekeeper and assure the voiceless are spoken for. Somewhere, economic growth has to be filtered through the sieve of environmental and social impact. Somehow, we have to ensure that history doesn't repeat itself, and the essential checks and balances hold business at bay. After all, it's not much use closing the gate after the horse has bolted.

But what if there was another way? Rather than overhauling the current systems, how about redesigning them? Take contracts as an example. Imagine if they were reduced to their core principles and read like comic strips, rather than telephone books. Imagine if they were written to encourage the behaviours we so desperately need to get our economies moving (like **innovation and creativity**) instead of a litany of punitive actions that will befall those who dare suggest a change to its terms for the better. Think of what could be unleashed, if contracts balanced our efforts and didn't bottleneck them. We may end up proving that, even in the complex world of projects, less is still more…

It's a process nightmare

Procurement and design processes can often feel like the Encyclopaedia Britannica of rules and roadblocks – smothered in fingerprints, with far too many fingers in the pie. A typically convoluted approval process of multiple gatekeepers that cause delays in part from lack of clarity of roles and responsibilities, but more around multiple hurdles to jump for multiple gatekeepers.

In a world where now the common vernacular is 'move fast', the time taken to realise a project or initiative often means it runs the risk of being out of date by the time it hits the starting blocks. Being first to get a foothold and stake your claim on the 'next big thing' is essential for success – yet **project approvals** and complex procurement processes work in the opposite way. This not only ups the cost for delivering the infrastructure but it ups the risk of running late and puts a dampener on the very economic activity that revenue strapped governments are so desperately needing to stimulate.

Never too old for comic strips

Too often, agreements for major projects are too complicated for their own good. Those who develop the agreement often lose sight of the original purpose and intent of the project and when it's written to focus on penalties for lack of compliance, the appetite for innovating quickly becomes zero.

Alternatively, imagine if contracts could be understood in intimate detail, including their intent. Imagine if your four-year-old son or daughter could make sense of it and actually enjoyed reading it. Imagine if the contract encouraged innovative behaviour and ideas in order to save time and money and that those ideas could come from anyone on the project?

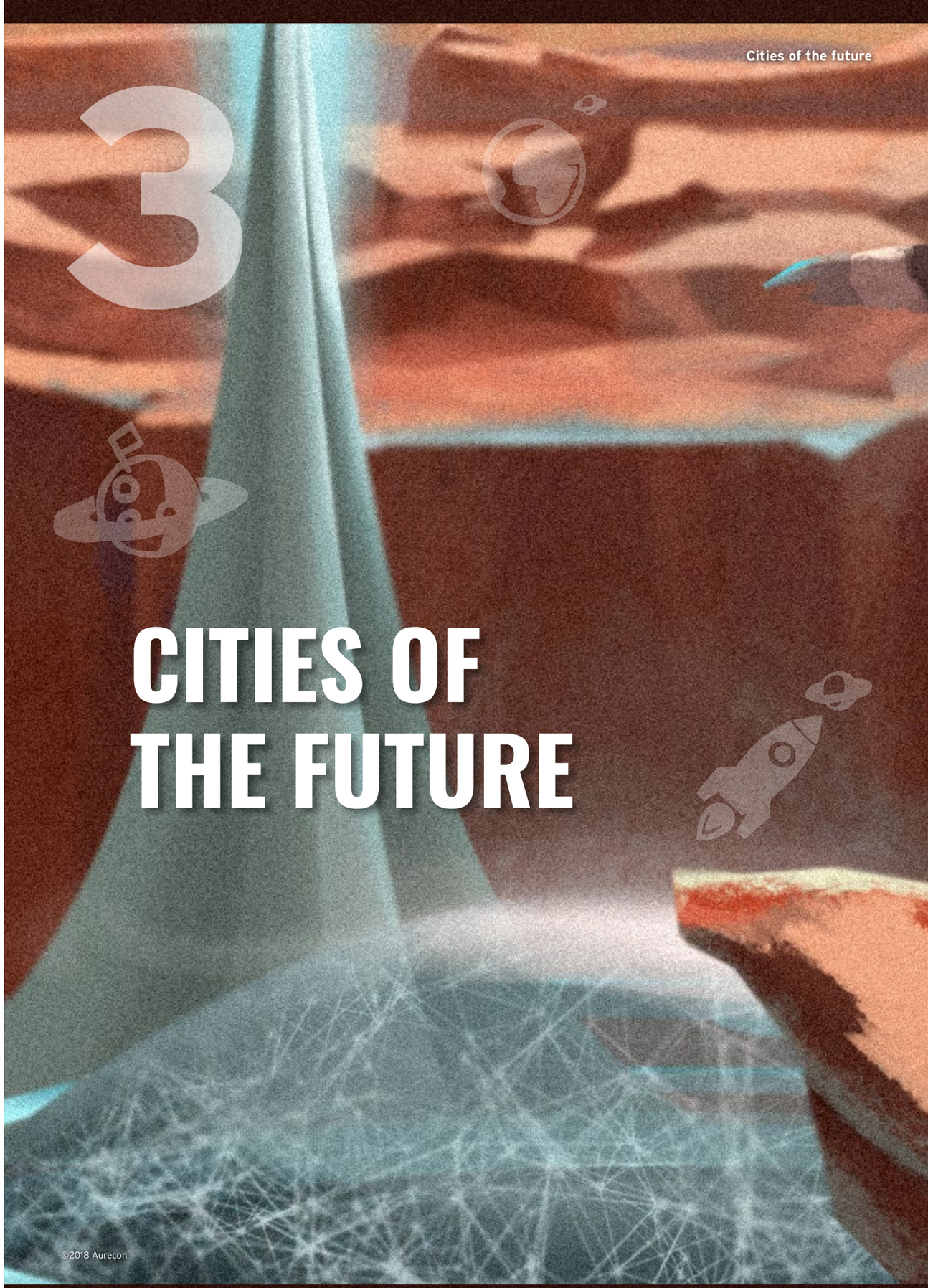
Believe it or not, it may be possible to take 300 pages of penalties and liabilities, of indemnifications and risk transference and distil them down to a mere handful of pictures that everyone can understand. They wouldn't require a magnifying glass to read them; in fact, there would be no words. Pictorial and to the point, these contracts would clearly indicate what is expected from all parties involved. No Juris Doctors needed; even our own kids could understand the take away. These comic strip contracts could be smart contracts as well, ensuring that companies only receive payment after meeting their pre-determined conditions set on the ethereum platform.

From where you're sitting now, this level of red tape reductionism may seem impossible. But **Prof Camilla Andersen** from the University of Western Australia believes it can be done, and it should be done. **Says Andersen**, "I think what we are seeing is that we're making law more approachable, we're making it clearer. The idea is to reduce conflict and to focus more on driving behaviour rather than focusing on creating a legally binding instrument."

Lawyer Robert de Rooy, who recently worked with artists to reduce the South African Employment Law contract to cartoons and used the cartoon concept to support 650+ contracts for fruit pickers, reports that this approach saw the onboarding of employees reduced from 4 hours to 45 minutes and conflicts at the end of the season to zero.

Of course, the danger is that you can lose some nuances of the contract when translating compliance into simple pictures. But this tension leaves companies to ask the healthy questions, 'What is the most important behaviour we want to address? And what can we afford to leave out in the larger scale of things?'

Ultimately, we all want the same thing. But how we get there needs to be reimagined. The business world today is overwhelmingly complex. But our solutions, in the face of this complexity, need to stay simple. Perhaps comic book and compliance have more in common than we think!



CITIES ARE BEING DISRUPTED WHO WILL WIN?

Matt Coetzee

More than ever before, cities need to draw on contemporary lessons from the business community to help them navigate an increasingly complex future. Companies that grow over time often suffer from a deep embedded conservatism. They do things "Because that's the way we've always done them around here..." Consequently, the business world is littered with failures. But there are also examples of stellar success. The question for our cities is: "Which do you want to be?"

In so many ways, cities can be seen in the same light as companies. Like companies, they face enormous challenges (and opportunities) brought about by a digital future. Fast forward 20 years, and all of us will want to live in what's being termed 'smart cities'.

Getting to this future, however, is proving to be a challenge. City leadership will need to learn lessons from businesses that have dramatically failed if they have any hope of creating a better future...

A famous example of crippling conservatism in the business market was Kodak. Ironically, it was Kodak who invented the digital camera, yet tragically they were declared bankrupt and forced to close their doors. What were they missing? As the phenomenon of collecting memories in real-time grew, and alongside this the ability to edit and share these memories, so did the plethora of companies who were clever enough to focus on meaning, and not technology, for breakthrough success. Kodak hired teams of industry analysts who all told them that digital photography was the future – but they fired them, and others to follow.

'Disruptors' such as the digital camera have been with us since the beginning of time. **The horse and carriage was replaced by the motor vehicle**; the mainframe computer by the PC; and Blockbuster by Netflix. What is new is the pace of change we're encountering today.

Smart businesses are realising that this **'disruption' poses a risk to their success**; and they're continually renewing their response and resilience on an ongoing basis. **Smart cities should be doing the same!** Our cities today are too often a myriad small councils who can rarely agree; or one large council who has its focus fixed on the here and now. Do they have the right strategic or visionary mindset to make the big decisions that are needed to achieve a smart city state? How can a multiplicity of councils truly **plan for autonomous vehicles** or smart power networks or artificial intelligence in everything?

In business, a proven methodology for success involves a deep understanding of the three risk horizons: identifiable risks; strategic risk; and emergent risk. City fathers should ignore this at their peril.

Most organisations are cognisant of identifiable, or immediate, risks and address these as part of a 'business-as-usual' approach. More evolved organisations develop strategies for overcoming risks that might impact them in the future; thereby creating competitive advantage over a longer period of time. Most organisations, however, fail to consider emergent risks. These are the obliques – the exponential technologies and things that are outside of their range of contemplation. Like Kodak, they fail to see the new disruptive influence and they fail to let go of the old in order to let in the new.

Climatic zones are shifting and if they do, will entire farmlands need to be relocated? Would city planners ever let go of their current location in favour of reconstructing elsewhere in a new, better location? Ocean levels are changing and different rain patterns are evolving and, if they do, how will this influence the manner in which cities grow? More importantly, what are the consequences of ignoring these risks?

Strategic planning at a city level will create an advantage whereby one city 'succeeds' in comparison to others. The first city to truly adopt digital will become a magnet for industries and, as a result, a magnet for prosperity and liveability.

Cities should not be run in the here and now. They should be run as elite business entities and follow a blueprint for success. Unless they are actively identifying emergent risks and strategising for long-term growth by seeking to create competitive advantage – they are, possibly, heading for a Kodak moment.

HOW URBANISATION BECAME THE 'DISEASE' OF GLOBAL CITIES

Abbas Jamie

As urbanisation increases, cities around the world are becoming congested and overcrowded. Inhabitants are fed up with hours in traffic and paying extortionate rates for accommodation. Against a backdrop of Brexit and increasing global volatility, are we starting to see a case for anti-urbanisation? Globally, more people live in urban than in rural areas and, by 2050, the United Nations predicts that 66 per cent of the world's population **will live in cities**. Are we making a mistake by accepting these statistics as inevitable? Is a blind headlong rush into urbanisation the best course of action?

Recent thinking confirms that the division between those who have captured the majority of the benefits from global integration and those who haven't runs between major cities and smaller communities. The Brexit vote confirmed this growing disillusionment – the sector with the highest 'leave' vote experienced stagnating median household incomes for nearly two decades.

This is particularly pertinent in the developing world where **population growth is highest** due to, among other reasons, high birth rates from younger populations. Is this headlong rush into cities a quick way to create slums? Or is there another way and, if there is, is there something that **developing nations could teach city planners** (and satellite city planners) in the developed world?

Africa is an example. As people across the globe move from rural to urban areas in search of a better quality of life that provides employment, basic services, **health facilities**, adequate shelter and access to the global community, Africa has started to ask: what if we could provide all of this to people right where they are? Would citizens still want to move to congested, overcrowded urban centres if they were offered a better quality of life in their own environment? And could this contribute to a much-needed slowing down of urbanisation, turning urbanisation growth on its head?

The notion of Rural Development Districts (RDDs) aims to establish development hubs that will be the missing nodes that make up a truly prosperous circuit for citizens across the country to plug into. Scattered throughout the country, RDDs will be deliberately located in areas which were traditionally disconnected from major economic hubs. Initially driven by agriculture, they will later house a broader range of other industries, provide residents with access to modern amenities and ultimately a better quality of life.

Unlike most rural areas, they will be fully online, making use of WiMax technology to address the 'last mile' problem and provide continuous connectivity. Their schools and training centres will grant teachers and scholars access to the world's brightest minds, while entrepreneurial centres will encourage residents to tap into the power of the cloud and develop African apps and online businesses that have access to global markets.

The RDDs also have the potential to provide perfect testing grounds for emerging technologies including 3D printing and advanced micro manufacturing. High tech components, produced for global export, could be produced in these locations which would have a significant impact on job creation outside traditional industrial zones, potentially disrupting the traditional industrial parks. Goods and people that need to move to urban centres could be transported via a national network of hyperloops that would connect rural liveable areas to the global market.

While the science of forecasting is uncertain, it seems very likely that some of the chronic stresses our cities face are set to get worse as urbanisation increases – including **climate change**, overcrowding and related social problems. Coupled to this, cities compete on a global scale. They attract populations and investment, which continue to support rapid densification. Investing in improving already strained city infrastructure isn't enough.

The rapid population growth in emerging countries and the potential for slums and degradation has to be **an alarm call for a different model to be considered**. It is not too late to shape the next wave of urbanisation. In fact, based on growing political undercurrents, this is something that all authorities need to embrace.

Economic ecosystems needn't always be centralised within a city. They can be decentralised, but connected via technology and **infrastructure**. If the basic ingredients of access to jobs, amenities and lifestyle can be provided outside our cities, then perhaps a solution to the negative effects of urbanisation is right at our fingertips. When we put human capital, and people's well-being, future careers and prosperity, at the pinnacle of the priority pyramid, we may just succeed in writing a new narrative around the next form of globalisation.

HOW CAN CITIES BE ‘SMART’ IF THEY CAN’T THINK?

Matt Coetzee

From 30 000 feet, you could be forgiven for thinking that a city has a pulse. On camera, time lapse photography of the morning in-rush of traffic, followed by the evening exodus, looks like a beating heart. The road networks in and out of cities create constant streams of cars – they are the veins that transfer cars out to its extremities. Zoom out even further, and footage taken over a longer period reveals how the city ‘grows’ as its borders expand. Its power network simulates the electrical pulses that race around a nervous system.

The further you zoom out, the more closely a city starts to resemble a living organism… but if our cities are living organisms, they are still pretty basic forms of life. They have no ‘brain’; and, in most cases, no cognitive feedback loop as to what is happening around their ‘organs’ (regions). It’s ironic that our most sophisticated form of living, the urban conglomeration, is also the dumbest.

But is all of this about to change? The Internet of things, sensors embedded in **‘intelligent’ infrastructure** and **autonomous vehicles**, holds promise of radical progress for the **future of our cities**. Is the birth of the smart city going to take this amoeba-like organism, struggling for survival at the bottom of a primordial lake, and move it into a sophisticated life form?

If our cities are about to evolve from something that simply survives, into a thinking, feeling entity that can self-regulate and self-modulate – we need to ask: What characteristics should these smart city ‘beings’ have? What sort of intelligence do we want them to have; and what will the benefits of that be? How will we ensure that the best characteristics will establish and grow and the others will be eliminated? These are critical questions!

In developing countries experiencing **rapid urbanisation** and steep growth in GDP, they have the potential to solve some of urbanisation’s wicked problems, such as congestion, social inequality and exposure to natural disasters. Pushed by multinational tech companies such as IBM, Microsoft, General Electric, Siemens, Oracle, Google and Cisco, billions of dollars are being poured into them. Usually built on greenfield land as city extensions, their shiny new creations – Songdo in South Korea, Masdar in the UAE, Konza Techno City in Kenya, or Palava in India, for example – are viewed as wonders of ingenuity.

But **are these cities really ‘smart’?** Now over ten years old, Songdo is barely 60% occupied, with much of its smart technology on hold for the moment. Masdar is well short of its green targets, disconnected from surrounding conurbations and unpopulated.

Konza is 37 frustrating miles away from Nairobi and empty – this may as well be a million miles. Palava requires residents to carry socially exclusive 'smart ID cards'. The technology these cities employ is impressive but **does it really allow the city to function in a smart way?** Does it intelligently connect the many city systems to allow dynamic adaptation, true optimisation and deep user centricity – all for the benefit of its residents?

American urban strategist **Boyd Cohen** makes a call for cities to evolve into what he terms 'Smart City 2.0'. An evolutionary step up from the tech drivers behind Songdo and its contemporaries, 2.0 sees more thought put into the intelligence installed in cities to ensure the technology solves real-world issues that matter to residents. Beyond this – their intelligent systems are connected and the information is utilised and processed so that the city becomes a highly functional, self-learning and self-modulating organism capable of responsive behaviour.

Cohen writes about Rio de Janeiro, where the mayor invited IBM to install a highly effective mudslide early detection system in the favelas. A truly smart city would be one which moves beyond simply noting that a mud slide occurred, to collecting data about the causes, managing those, directing emergency services when an event occurs and notifying residents of alternative emergency housing.

If we are to ensure tomorrow's cities move beyond functioning as basic forms of life, we must ask some deep questions about what it might take to ensure they evolve in a meaningful way. The evolution must solve relevant problems and make the liveability of residents its central purpose. As engineers, architects and planners, seeing our cities as living beings in which intelligence is connected to relevant functionality is key. Every intelligent organism requires built-in capacity to 'think' and it's time our cities achieved the same. Now that really is smart!

OUR CITIES ARE FULL – WE NEED NEW ONES!

Matt Coetzee

By 2050, the UN predicts that cities will somehow accommodate a massive 2.5 billion more people than the 4 billion that already live there. The big question is, where are they all going to go? How do we make sure these places are fit for the continued influx of people? By walking a mile in their citizens' shoes, could we simply replace imperfect cities with improved ones?

People must live and work somewhere. Given ructions in the world economy, evidence shows that more people believe their best bet for a better life is in cities. This is especially true in developing countries. And they're right. According to the UN Habitat, urban areas generate 70% of global GDP.

Existing cities have developed for good reason, but always piecemeal, forever behind the rising curve of practical need. Demand outstrips supply many times over.

Cities can expand upwards or downwards, but this is a finite solution. More often, cities sprawl sideways, the centres de-densifying in favour of suburbanisation. Inhabitants often discover that, at the periphery, there is no public transport, forcing them into cars which worsens congestion, pollutes the air and ups the per capita carbon footprint. Life becomes stressful, with residents more prone to ill-health. New arrivals intent on bettering their lot face problems. Native inhabitants intent on protecting their advantages face problems. And no one is consulted about the change.

Is better urban governance part of the solution? City leaders do organise, driven by a worthy ambition to provide shelter for all citizens. However, they suffer the same fate as the city's infrastructure. They are unable to keep up with the real issues.

The American academic Benjamin Barber, author of 'If Mayors Ruled the World', is optimistic. He sees city governance as the model for a post-national, interdependent political landscape. In his words: "The road to global democracy runs through cities". It's already happening. Mayors are meeting the challenges pragmatically and, by virtue of their semi-autonomous power base, are able to share these lessons with other mayors below-the-radar of national governments. By splicing out their city's good genes, they can be recombined elsewhere to beneficial effect.

South African urbanist Edgar Pieterse, though, is not so sanguine. City leaders are not adequately representative or responsive. He argues for the reinvigoration of civil society to include the everyday concerns of marginalised people, especially of cities in the developing world.

Alessandra Orofino, based in Rio de Janeiro, has the tools to enable that engagement. She's the compelling force behind Meu Rio, a digital platform for grass roots civic participation. Her tools are being used to air local grievances, rally support and change policy in Rio. Her battle cry is, "It's our city: let's fix it!"

These efforts tackle symptoms. They do not reconcile clashes between old infrastructure and new technologies, or between native and newly arrived citizens. Is there a more radical solution? Is there a circuit-breaker to halt the downward development spiral?

Paul Romer, an American economist, thinks there is. In his view, attempting to expand existing cities is doomed, especially in developing countries. Instead, he thinks we should build new charter cities. Charter cities – cities that operate to their own set of special rules – have the unique quality of allowing experimentation by recombining good urban genes imported from more economically mature corners of the globe.

Modelled in part on Shenzhen in Southern China, his idea is that these experiments must be brand new, with the rules drawn up beforehand by the host country. That way, investors, companies, workers, and families actively opt-in to migrating there in preference to other cities. The infrastructure and public services are planned for 21st century conditions. Opportunity for citizens is equal. And if the experiment works, the rules can be adopted across the country.

Of course, success is in the detail. Setting rules that reform poor governance is a tall order. But by matching the common experience to expert knowledge, and integrating our findings with tech and good governance, perhaps we can walk the extra mile in citizens' shoes – so that they don't have to.

DESIGNING CITIES OF THE FUTURE: PRESS RESET NOT REPLAY

Rowenna Walker, Garry Graham, Seamus Murphy, John Cranley & Ben Fluck

Cities are the engine rooms for economic advantage on the chessboard of global competition. They throb with the possibility of what could be, where the power of intellect and muscle are brought together in an exotic mix to avail their ingredients to the entrepreneurialship of human ingenuity. Yet despite their potency, there is something else that a city needs to fan the flames of economic growth.

Beneath the foot traffic of its pavement, urban underbellies are underlain with infrastructure that convert raw materials into products and services. Power, water, **transport systems** and communications are the pistons that drive the ebb and flow of trade and industry. Cities move and morph and forge the economy forward, all within a day. And those who occupy its nooks and crannies are ideally the first to benefit from its good graces.

It is worth stepping back to consider how it is that they came about and what it was that **brought them into existence**. It is worth considering how is it that this formula has been magically repeated with an uncanny consistency in countries around the globe over hundreds of years.

It is unlikely that the founding fathers all got the same "how to build a successful metropolis" memo. However, they appear to have in fact stumbled on the same logic on how to transform a small hamlet into a burgeoning powerhouse of humanity. At some point in time, cities all had a beginning. They all started as an open area, fording a river or neighbouring a port, to enable the transit of goods and raw materials. Coupling this advantage with the region's proximity to arable land, these settlements provided ripe ingredients for **agriculture**, trade and industry to thrive and diversify over time.

But the world we live in today is changing. As **climate change** radically impacts on the arability of surrounding regions, we no longer have the luxury of unclaimed coastlines and ample resources. As fossil fuels deplete, energy costs increase at an unchecked pace. As consumers become more informed, companies are striving to find a new elixir for success. If it is cities that drive economic growth, have the rules on their chessboard changed and, if they have, what **checkmate strategy should a nation do to reposition itself** in the global competition stakes?

In his book, **The Weather Makers – The History and Future Impact of Climate**, Prof. Tim Flannery postulates that urban visionaries will have to author a new 'city play book'. In a world of declining natural resources and rampant escalation of energy costs, where consumers are choosing to buy with an ecological conscience, Flannery says the critical

factor for city creation will be different in the future. Future cities will hinge on access to **low cost renewable energy**.

With urban peripheries already bulging at the seams, countries will have to find new spaces that can optimise the use of alternative energies to **desalinate water** and convert land into something arable and liveable. Low cost renewable energy will become a city's kryptonite, allowing businesses to satisfy their sustainable credentials for an ever discerning and demanding connected consumer generation.

Flannery even went a step further by envisioning **a brand new city** that he calls 'Geothermia'. By tapping into the abundance of subterranean heat and solar potential of central Australia, Geothermia would operate as an inland city on its own — "a city not of thousands but of hundreds of thousands — a place with its own critical mass," says Flannery. The abundance of space would give lots of breathing room for building, agriculture or industry, as well as solar collectors to run the city on emissions-free power.

The model makes an interesting case for radical new thinking around old patterns of **urbanisation**. Rather than pressing 'repeat' and doing more of the same thing to accommodate the influx, Geothermia hits the 'reset' button on traditional city building. It offers an altogether 'other' narrative that requires insight, urgency and a good dose of grit to jump off the fossil fuel bandwagon and tap into uncharted forms of renewable energy.

But there are other needed ingredients that go into the secret sauce to make this future city vision a reality.

A vibrant and efficient inland **transport system** would be essential to the process to feed this new conglomeration. Efficiency through smart rail would be the artery needed to pump life-giving blood to this theoretical concept. Though travel by air, car, bus or train would probably remain the transport of choice, inland cities would need a well-designed, highly efficient, low-cost rail system to get all those bulky goods and raw materials from one place to another. Round off the trifecta with an ubiquitous high-speed communication network, and you may be looking at a persuasive formula for **future urban design**.

Granted, we are all out of our depths when it comes to costing the vision. Through experimentation and analysis, experts are still tallying up the total. It would definitely be expensive – frighteningly expensive. But let's face it — the alternative of carrying on 'as is' could be even more costly down the line. Nation building projects are expensive – but if the pay day is commercial advantage for your nation for the next 50-100 years, perhaps Return on Investment isn't that bad. What's more, when you compare that to the very large cost of having to **put roads in tunnels** to beat congestion and turn houses into high rises to meet the occupancy density – perhaps the equations start to balance out.

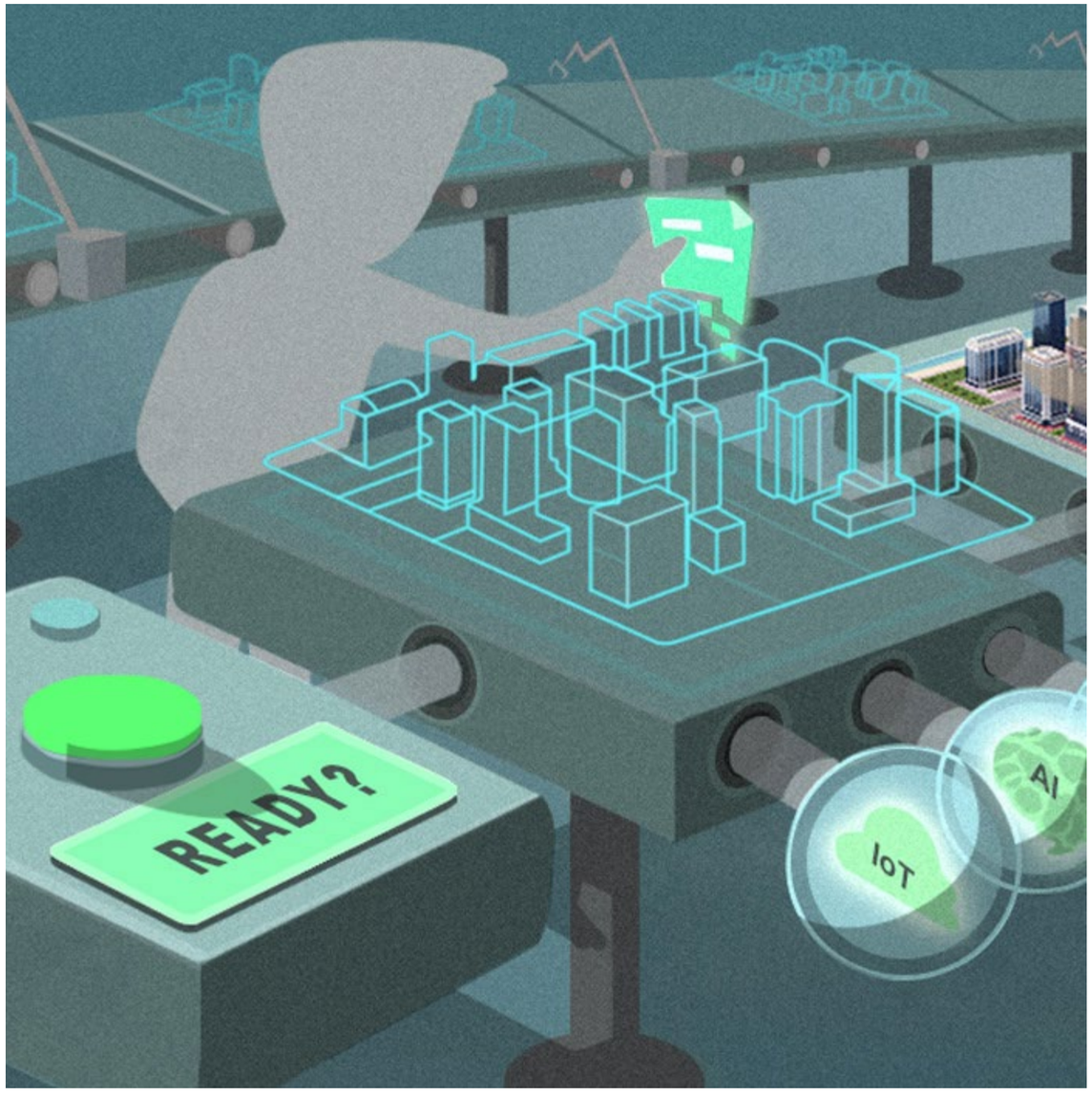
In the long run, a Band Aid approach delays the inevitable dysfunction and economic downgrade of an oversaturated city with big appetites for limited space and natural resources. So, the question is, do we want to pay now…or pay later? The latter is most probably a price none of us can afford.

In our current connected world of globalised trade, it seems everybody is **trying to outwit the opponent** and gain the upper hand advantage. But the problem is the fundamental recipe for city building still has not changed. Our problems, and the nature of our solutions to those problems, are still cut from the same block despite the fact that energy cost escalation and climate change is changing all around us, and we are not developing a compelling economic strategy despite these undeniable trends.

Maybe nation building inland transport systems and countrywide high-speed communication systems are exactly the "surprise, surprise" we need to get in front of the competition and stay there in a climate-challenged world. The existing business model only perpetuates the same cycles of rampant exploitation and consumption which, if unaltered, could potentially dig our own financial graves. A radically different paradigm is in order. It's risky and unknown and will require big picture thinking of all new proportions. But with tools and technologies paving the way to these solutions, this fresh new thinking may carry the economic equivalent of a global checkmate.

COULD BREEDING A 'DIGITAL TWIN' SAVE OUR 'DYING' CITIES?

Matt Coetzee & Jacob Lindsay



In the controversial novel 'My Sister's Keeper', parents conceive a 'saviour sibling' for the sole purpose of producing compatible organs and blood that will save their firstborn from a fatal disease. However disturbing this may sound, our cities are sick – very sick. Under strain from urbanisation, pollution, climate challenges and poor governance, could a 'saviour sibling' be a remedy for our sick cities? Could an ill, dysfunctional city be 'treated' through the creation of a 'digital twin' as a test bed to prototype urban ideas in a low-risk environment?

Testing the twin

A digital twin is a virtual model of a city; a digital model of the physical world. Digital twins can be developed for a range of 'applications' such as products, buildings, a process, factories, cities, and even people. But the real value lies in the potential of a digital twin to save its real-life 'sibling'.

If we created a 'digital twin' of our existing cities, could we contemplate ways to improve them; apply those improvements in the digital version and then track the responses? The opportunity would then exist, of course, to carry these lessons over to 'real world' applications so that our reality would be made more resilient, more responsive, and less exposed to physical, social and economic challenges?

The birth of digital twins is on the increase…

Digital twin technology was ranked Number 5 in Gartner's Top 10 Strategic Technology Trends for 2018, with predictions that billions of things will have digital twins in the next few years. NASA was using digital twin technology for decades before the term 'digital twin' was coined. They use virtual models to develop and maintain systems they can't physically monitor in space, including running complex simulations of spacecraft responses. What it offers is dynamic, rapid, low-risk, real-time diagnostic and problem-solving capabilities.

Driving the growing application of the digital twin concept in cities will be an enormous number of interconnected Internet of Things devices with real-time, cost-effective data feeds. A surprising number of everyday devices are already connected to the internet – including digital assistants such as Siri, Amazon Echo and Google Home.

Right now, you can digitally connect to your home heating, your car, your front door, your fridge… and your heart. These all provide a ready database of cause-and-effect responses which are the foundations for the development of a representative digital twin. An environment is fast emerging that will enable digital twins to flourish, connecting the

physical to the digital world in ways previously unprecedented; not only device-to-device, but the physical world to the digital one.

Singapore's digital twin is due in June 2018

Under development in Singapore right now is a digital twin called 'Virtual Singapore'. Virtual Singapore is described by technology partner Dassault Systèmes as "the world's first digital twin of an existing city state and will provide Singaporeans with an effective way to engage in the digital economy. It will be both a collaboration platform for city departments and businesses, and a communication platform between the city and its citizens."

The digital twin differs from other modelling approaches in that it can be designed to monitor and model multiple elements and the interactions between each elements such as population density, transport, water, weather, energy transmission, energy consumption, waste management, security, people movements, and consumer purchasing... all manner of activity in a city.

Our cities can be reimagined by changing variables and understanding the impact. A virtual twin will help urban planners and policymakers visualise the responses from various sensor networks and intelligent systems deployed now and in the future – and they will use them to make informed decisions, using the twin environment as a test bed for innovative urban ideas.

Sibling rivalry

The power of a digital twin city will be in how it strategically uses technologies like the Internet of Things, Artificial Intelligence (AI) and Big Data. Feeding the sibling will be multiple streams of data, both historical and in real time.

Those cities that are able to leverage this technology and harness the benefits will be the communities and cities that prosper they will become more environmentally, economically and socially sustainable.

But are we really ready? The sibling could well become an intelligent counterpart trying to compete or to even make decisions for us. And, as with all 'operating rooms' where we monitor, diagnose and treat the sick – we'll need skilled doctors. Will they be real or virtual? And, are we ready for them to alter the DNA of our cities... what ethical framework will these doctors use?

Enabling these 'digital twins' will involve the labour pains of ensuring our governance as well as ethical structures are 'birth-ready'. There's also the question of **"Who owns the data?"** – the government, the private sector, the digital twin platform, the autonomous vehicle that creates the data, or the citizen who is feeding data into the twin model?

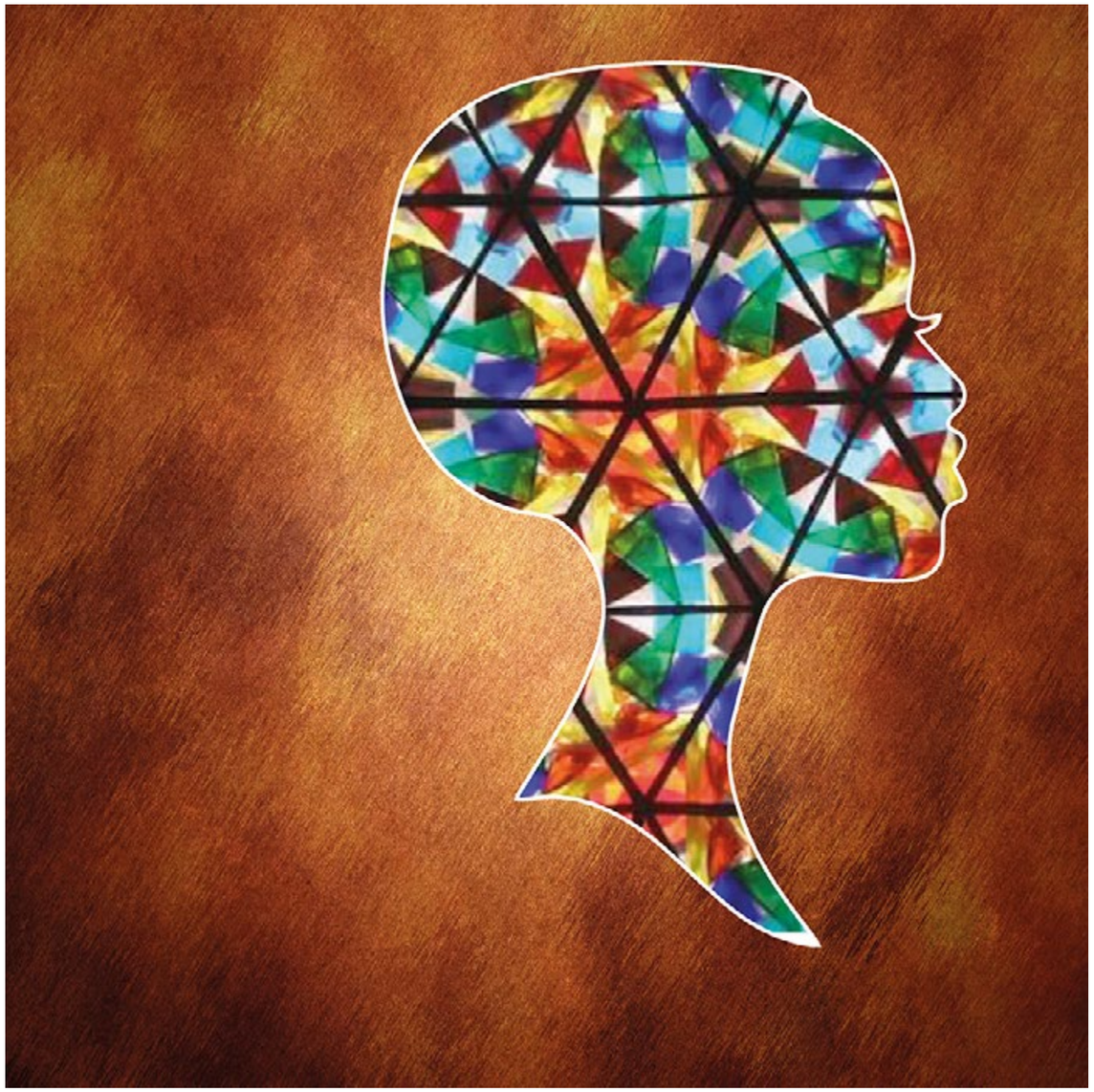
It will also be crucial to ensure the accelerating pace of technology does not move faster than our ability to understand the consequences and plan how best to use digital twins for the benefit of all. If we can do that, we may just be able to create our own 'saviour city'.

4

DIVERSITY

DIVERSITY OF THOUGHT – THE KEY TO UNLOCKING THE FUTURE?

Tracey Matthews



In 2016, Nkiruka, a sixteen-year-old African girl, contemplates her future. She needs to make educational choices. Should she follow her heart and study the sciences? She dreams of becoming an engineer. She's torn, though: the profession's not known for its diversity. So what should she do? Just imagine if she could travel in time to see how it worked out...

Leap forward to 2066. Nkiruka is now the CEO of a large, successful multinational, multidisciplinary, engineering firm. On the eve of retirement, she is satisfied that her sixteen-year-old self would see that the dream worked out. But not without bumps along the way. Or perhaps because of them.

During the intervening years, the world has been turned on its head. Climate change has radically disrupted patterns of trade. Economies have risen and fallen. The **populations of Africa and Asia have skyrocketed**, transforming global markets and dramatically altering their needs. Technology changes have revolutionised societies. Health impacts have severely tested healthcare systems. Digital access has spread to all corners of the planet, empowering new constituencies of people as never before. Bowing to demand from their better informed electorates, politicians have enshrined equality and diversity as a right.

Under these pressures, a million new engineering challenges arose, requiring fresh perspectives. But the innovators of yesteryear were unable to adjust. Attuned to a different world order, they quickly ran out of ideas.

Nkiruka was smart. The solution seemed very clear to her. How else to find new answers, if not by involving diverse people? Early on in her career, she saw the opportunity, and reached for it.

When she was newly qualified, she realised that the only way to meet the needs of her clients was to represent their customers, and that meant change in her workplace. Her employer was already on the ball, committed to diversity at all levels of seniority across all departments. Regardless of the moral need for equal opportunity, it saw the potential for internal business benefits.

Nkiruka painted a more ambitious picture, though. She saw enormous external business benefits, and volunteered to help achieve them. She pointed to the **'Power of Parity'** report by McKinsey Global Institute, which predicted a 26% increase in GDP simply if gender inequality could be eliminated. If that was true for gender equality, she argued, think of the potential of full equality. The agenda was set.

It wasn't easy or straightforward. The company's culture needed a reboot. Over time and with new initiatives, though, they reaped the rewards. The child and elder care facilities and flexible working arrangements attracted the best talent from under-represented groups. The human resources department used blind CVs to help avoid unconscious bias and predictive analytics to identify talent hot spots. Staff were trained in **inclusive leadership** as a matter of course.

With careful blending of teams, it began to work. The company's lobbying efforts to national governments on diversity sat well with their clients and suppliers. Its charitable schools programme role-modelled different kinds of engineer. In short, diversity became an explicit strategic resource that differentiated them from their competitors.

The business case became stronger and stronger. Not only did the talent come, it stayed. Design teams swerved groupthink with diversity of thought, winning valuable new work. And eventually, with the workplace culture transformed optimally, the company grew a reputation for finding fresh, innovative solutions.

The CEO looks back in satisfaction. Her vision for balanced diversity unlocked the future. Much more than a moral crusade or a PR stunt, she harvested positive intergenerational, material benefits not just for the company, but for the world.

Back through the decades to 2016, the hesitant sixteen-year-old Nkiruka trawls the web and comes across a quote by Michelle Obama, First Lady of the United States. "No country can ever truly flourish if it stifles the potential of its women and deprives itself of the contributions of half of its citizens." It is a lightbulb moment for Nkiruka. With a twinkle in her eye, she chooses engineering.

5

ENGINEERING

OUR DESIGN OF UNIVERSITIES IS WRONG

Jeff Robinson

If robotics replaces many of the functions traditionally carried out by humans, there is an urgent need to rethink the design of our universities. Human hands are no longer required to wash and prepare vegetables for mass packaging; or count out how many paperclips are dropped into a box. Robotics is starting to displace many manual labour functions, particularly those of factory workers. But with robotics advancing exponentially, are we fast reaching a place where they will soon have the potential to substitute not only human hands, but brains as well?

Amy Webb, a digital media futurist, predicts that **at least eight career fields are "ripe for disruption"** – and they include lawyers, cashiers and journalists. In the same way that robotics disrupted the blue collar worker; the disruption of the 'white collar worker' is now on the cards. Already, we're seeing the commoditisation of doctors, engineers and accountants.

Mayo Clinic has deployed IBM's Watson to assist in diagnostics, and this tool is 'beating' the speed and accuracy of diagnoses by clinicians. Modelling tools are replacing more traditional drafting functions in engineering and architectural companies, as well as quantity surveying functions. **Flux** has the potential to displace many aspects of 'design' activities by engineers and architects. Self-taxation aids are challenging what accountants do.

As a result, it's highly likely that careers will no longer have the ability to last a lifetime and a large portion of the workforce may be forced to retrain multiple times during their careers.

Tomorrow's employers will value different skill sets than today's – and this will fuel the need for upskilling, reskilling and different skills, in order to keep pace with the changing face of the work environment as we know it.

Our **universities of the future** will be frequented by first-time attendees, but also by second-time attendees and, **if longevity increases**, perhaps even third-timers… and this will govern how we design education facilities in future.

What needs will an older set of learners have? They won't want to sit through another four-year degree course. Their intimacy with the latest tech trends won't be the same as that of school leavers. The way that they learn is and will be different from the so-called 'youngsters'.

With families and existing financial commitments, will facilities have to be designed to accommodate more intensive, fast-tracked courses for larger groups? Will they need to pay closer attention to mobility to allow people to get in and out of campuses quickly and back to work? Will companies collocate onto campuses? Will they need to be more digitally savvy as larger audiences sign up for courses more relevant for the future, requiring overflow halls that broadcast lectures live?

If educational facilities want to thrive in future they need to understand how industry will change in a disrupted world and the demands that industry will place on their workforce. They need to be anticipating these changes and having the debate now about the campus design, the course offerings and teaching methods that will meet the needs of the future learners (of all ages) and respond in ways that will be considered indispensable in a changing future.

WHY THROWING TECH AT A PROJECT DOESN'T 'FUTURE-PROOF' IT

Matt Capon

The smartphone (tech) era allows us to capture every good (and bad) hair day down to the finest detail and the selfie has become as routine as brushing one's teeth, yet – retro-styled mechanical cameras that go 'click' and spit out faded photos are making a gigantic comeback. Fujifilm, makers of the popular Instax camera, sold 5 million of these last year, representing a 30% increase year-on-year. What's more, this analogue camera is outselling digital devices four times over.

Why is this throwback, analogue technology enjoying such popularity? Is 'retro' just a passing flashback 'fashion' trend or is there something deeper at work?

Professor of Leadership and Innovation Roberto Verganti believes that "What makes people really passionate is not a solution; it's the discovery of new meaning". Could it be that an (instant) image in hand represents something 'authentic' and 'real' in an age of high-resolution yet all too often edited, retouched or #filtered?

The Fujifilm camera has managed to capitalise on an era in which authenticity is sorely lacking and develop that (pun intended) into a thriving business opportunity. It's also a reminder that the people at the centre of our designs are just as important as the technology we're expecting them to use. Digital photography is gaining ground; but if users aren't keeping pace, they risk alienating their own market. Put another way: throwing tech at a project or product does little to future-proof it.

The world of manufacturing is littered with tales of woe – products that possessed technical superiority, yet were 'beaten' by lower tech rivals that managed to capture the hearts as well as the minds of the users.

The video cassette recorder (VCR) 'war' saw the Sony betamax video recording system lose out to the VHS despite being technically superior. Sony hadn't made a flawed product, but they'd misjudged the home video market. Their one-hour recording limit wouldn't cover a baseball game or a movie and consumers flocked to own tape formats that could record two hours or more. Betamax was, in theory, a superior recording technology in terms of resolution, sound, and a stable image as well as recorder quality, yet these differences were negligible to consumers.

In 1972, the Nakagin Capsule Tower was dubbed 'the future of housing' and its sci-fi appearance had everyone predicting that similar capsule towers would eventually dot the Tokyo skyline. Today, however, only 40 residents remain – the tower was the first and last architecture of its kind to ever reach completion and is a monument to a path not followed. Its cardinal error was the failure to test how its user's interaction with technology might evolve. The round, frosted glass windows were a 'technical' feature, but made living inside the capsules unbearably bright.

Today's developers (and engineers) are faced with the challenge of designing buildings for a future person living in a futuristic world. Given lengthy project design, approvals and funding processes, it could take years for a project to move from concept to completion – and after this period of time, the original design is no longer 'new'. How do they know what to design when they don't know what is to come?

The implementation of technology for technology's sake isn't enough to sustain a product or infrastructure into the future, without a sense of purpose or meaning inappropriate technology can ironically shorten a project's lifespan rather than increase it.

QV.1, a 40-storey modernist skyscraper in Perth, Western Australia was completed in 1991. The fourth-tallest building in Perth, architect Harry Seidler won numerous awards for its innovative design and energy efficiency. Despite the advent of Green Star and new technologies, 15 years later, QV.1 and its sister designs in Melbourne, Brisbane and Sydney are still highly desired and very functional premium grade office spaces. Harry understood how to ensure a project's relevance long after inception.

Likewise, the Aeron Chair has outlasted fad. A radical design at the time, its performance is as good today as it was in 1994 and it is featured in the Museum of Modern Art's permanent collection. According to Bloomberg, the Aeron Chair "made a fetish of lumbar support…because that's what people think is required for it to be a scientifically 'good' chair". Their understanding of consumer expectations paid off – with the chair dubbed 'America's best-selling'.

And for a technological equivalent, look no further than the computer mouse. In 1980, Apple asked IDEO to develop a mouse for their new computer, the Lisa. It is as good today as it was back then. The Apple mouse was required to be more reliable but less than 10% of the cost of the earlier version. Their improved and cheaper mechanism proved mechanically and economically sound and was changed only slightly for use on the first Macintosh computer. This basic mechanism design is now used in virtually all mechanical mice.

All of these examples were designed to address widely different but very explicit meanings for their users – causes which have proved timeless.

As we move deeper into the digital age, technology with real meaning and value for the user will rise to the top of the pile of all things digital. Likewise, the places and spaces we inhabit must be aligned not only with our technology needs now, but also going forward. Fujifilm's camera was able to transcend a couple of decades of relatability because it speaks to the core needs of the user – it answers the call of humanity for meaningful technology.

As we move into a technology-saturated market in future, designing our projects to fulfil a range of meaning or purpose for the people that will live, work and play in them will see us start to future-proof our designs.

SHOULD WE TRUST ENGINEERS TO DESIGN INFRASTRUCTURE?

Kylie Cochrane

Engineers have traditionally played the role of project designer, engaging the community for feedback and endorsement only. What would happen if we put the power of design in the hands of the end user – the community? Who better to craft their local spaces than the ones who live, work and play there?

Authorities can commission a road, a rail line, a gas or water pipeline – but, in the absence of community feedback, they can't hope to properly understand the effects of that infrastructure unless they consult the people who will actually use it i.e. drive the road, take the train, use the gas or the water.

Rewind even further, and authorities may discover that these 'local experts' could have provided vital inputs into the challenges and intricacies of the need for, and design of, such **infrastructure**, including the landscape and local user issues. This way of thinking recognises that the most powerful resources in the room are not always the engineers. Truth be known, engineers have a tendency to focus on the technical outcomes at the expense of the human experiences.

The reality is that the community understands the needs and nuances of their city spaces best. They not only understand the city's culture and build environment; they define it. Their daily experiences and observations as parents, professionals, students and artisans together tell a story of what the city needs to thrive. Who best then to engage in its formation than the citizens who make it come to life?

Although our heads are important, have we forgotten to also think with our hearts? All too often, engineers and their designs consider only the obvious: safety and buildability. But what might it be like to use that same infrastructure, particularly if you are frail or elderly; have a child in tow; use a wheelchair or don't speak the language?

Powerful examples of forgetting the end-user abound.
The Myki system in Melbourne, which was originally an innovative move to create a paperless ticketing system, was not user-friendly, particularly for tourists. The City eventually reverted to making travel within the CBD free on the trams.

In the United States, where touch screens and keypads control voter results, a recount declared George W Bush the winner of the Florida vote and Presidency in 2000 by 537 votes. However, it was estimated that four to six million ballots were never cast or recorded – a third of which were due to mechanical and technical failures with clogged punch holes on the ballots, a piece of electronic voting that is lower on the technological scale (Selker). Leaving the design of **digital infrastructure**, like electronic voting, to software engineers without thinking of the needs of the people who will use those systems will likely always result in failure, as was the case with the US election (and the recent Australian census).

Is there a different way? Co-designing these projects in conjunction with those who use them might well have resulted in better outcomes first time round. We simply can't afford our cities and infrastructure to be wonders of engineering that not many people engage with or relate to.

In a **recent study**, between 48-80% of city dwellers across seven countries claimed they wanted to make an active contribution to society. And Zef Hemel, Deputy Director of the City of Amsterdam Planning Department, says they rightfully should: "Today, it is citizens themselves who are the experts. They are well educated, use ICT every day, and know their own environment inside out… We therefore have everything to gain by involving them in our thinking about the city of the future and benefiting from this 'collective brain'."

But how? Zef adopted the 'WikiCity' model for Amsterdam city – an open planning concept that incorporates the opinions and initiatives of its residents for future city improvements. Taking its cue from Wikipedia, the model asserts the advantage of multiple stakeholder contributions, by offering a platform for every individual to envision and collectively shape their city.

Similarly, architect and entrepreneur Ekim Tan developed **'Play the City'** – a city design and research game that brings investors, developers, architects and, of course, citizens together under the same banner of community design. Tan believes that the critical intellectual does not always grasp the sensitivities of members of society. These fun, hands-on games often involve 3D models in which players can dialogue throughout the constructive phase until reaching a happy and informed consensus.

With home carers and professionals, students and local politicians standing around the same city model, equally invited to the table, it's proven an effective way to generate full-bodied representation and resolve future conflict.

Beyond community design, our cities also face mounting challenges into the future – congestion, urbanisation and pollution. An engineer-centred approach to solving these is efficient, but sterile. A human-centred approach is critical if we want our cities to be liveable.

Today's world is increasingly horizontal, with blurred edges between former categories of professionalism and expertise. We need to recognise that local and lived expertise is just as critical as technical expertise. The idea of inviting the community to co-create its own collective space is not a pie-in-the-sky concept; it is a direct response to a fundamental shift in society. To paraphrase Zef Hemel, our society can only benefit from working with our 'collective brain'.

TRANSPORT INFRASTRUCTURE – WE KEEP BUILDING WHAT WE DON'T NEED!

Jeroen Overbeek

Elon Musk is one of the biggest names in transport innovation. He is known for investing ahead of the curve, and predicting needs ahead of time. **Tesla**, **SpacEx**, the hyperloop. It is no surprise that among his favourite works of science fiction is Isaac Asimov's famous 'Foundation' trilogy. This imagines a universe where mathematics can accurately predict the future.

Hari Seldon, the genius behind the concept, uses it to foresee the inevitable fall of the Galactic Empire followed by a terrible dark age lasting 30 000 years. Terrified by this prospect, he proposes the establishment of a Foundation that, by **reengineering the present**, can limit that period to just a thousand years.

We are doggedly **investing over a trillion scarce dollars** a year in new carriers, **ports**, **roads**, **railways** and **airports**. The big question is, are they the right kinds of **infrastructure**?

In a world of austerity in public finances and scant natural resources, should today's governments attempt to set up their own Foundation for transport infrastructure?

The signs are there. Business-to-business **freight transport** is no longer able to operate to capacity. The shift in tiger countries from export-driven to consumption-led economies is damping global transport growth. Huge brands like Adidas have begun to near-shore their factories. The increasing scarcity and cost of extracting commodities is improving the case for local recycling, bypassing the need for bulk imports. Public opinion against food miles is creating a market for urban farms, lab-grown meat and hydroponics. The adoption of wide-scale 3D printing may mean that small manufactured goods never see the inside of a container. The switch to **renewable energy** is cutting down the demand for transported fossil fuels. Even as ever bigger ships and ports are being built, the trend is shifting from mega-ship hub-to-spoke distribution to small carrier point-to-point distribution.

In business-to-consumer freight, the signs are just as persuasive. Business is booming. The culprit? **Smart new digital technology**, bringing real-time planning, open traffic data, and social customer service. Digital giants like Amazon are gradually transforming into formal transportation service providers, eliminating the waste associated with document handling and freight booking. Agile new digital platforms for crowd-based last-mile delivery solutions such as on-demand delivery services Postmates, Shyp and Deliv are turning investors' heads. Driverless vehicles, automation and drones are undermining the essence of traditional infrastructures.

And the churn is just as strong in passenger transport. Public authorities see mass multi-modal public transport as the engine of the economy. Congestion, poorly integrated systems, rapid population growth and urbanisation are driving different solutions. Old systems of herding, flat-rate pricing and prioritising the needs of infrastructure are giving way to more bespoke solutions for the passenger. Supported by the **Internet of Things**, automation and cognitive tech, the sector is being revolutionised.

This future is still a mirage in many parts of the world, but it is resolving into a viable new way of transporting things. How far off it is, to a certain extent, in our control. Modelling transport on a city-wide scale is already possible. **MATsim Singapore** is a good example of a powerful tool that simulates transport flows, helping to plan future mobility needs and its supporting infrastructure. Can it be upgraded for modelling international freight?

We can let natural progress take its wasteful course, plunging us into a metaphorical 30,000 years' transport dark age that we can ill-afford. Or should we set ourselves the task of engineering a less wasteful, faster route serving the public good for a strong economic future?

Hari Seldon, the fictional mathematician, understood that the successful manipulation of the future required a foundation of the best minds in the galaxy to integrate all strands of human knowledge into a unified theory of society. It will take something similar in transport planning and engineering to nudge it onto a path more closely aligned to future need.

LETTING OUR CAPES FLY: WHY ENGINEERS ARE AWESOME

Michelle Doolan

You don't have to sit a 5-year old down and teach her the physical and psychological benefits of building forts. Chances are she has wrecked your lounge many times before. Written into the defaults of our DNA is the impulse to create to bring something that never was into being.

Take away the plastic weapons of mass destruction from your toy box, and watch your toddler turn his peanut butter sandwich into a gun. Beach sand becomes castles; snow days invite igloos; the world is a wonderful palette that kids just intuitively want to paint on. Essentially, the engineer is hidden inside all of us.

The question for us engineers who still hold the title is, are we still living like one? Because we may need to be reminded from time to time, the job of an engineer is a great one. By comparison to some of the other professions, engineering is often not seen as the "cool" one. TV shows like LA Law and Boston Legal glamorise legal eagles battling it out in high profile court cases. ER, House and Scrubs bring the world of medicine into our living rooms. Even Grand Designs puts architecture on a pedestal. Isn't it about time that TV producers got in touch with the profession that is shaping the future world we live in like no other?

As a discipline, it lies at the very fabric of our society, shouldering the systems and spaces that give our world its meaning. Too often the profession is associated with hard hats and tool belts, viewed as difficult and esoteric. But in reality, engineering is a far cry from 'restrictive' and 'routine'. It is alive and multidimensional, unleashing the power of connected societies to unlock the impossible. Engineering invades every domain and asks the question, 'how can we make this space into something fantastic?' To be an engineer is to be nothing less than the shapers and problem solvers of our collective future.

We get to do this

Confucius said, "Choose a job you love, and you will never have to work a day in your life." In spite of the many challenges and demands, the job of a passionate engineer should often feel like play. Edges are invitations; and we, of all people, should welcome the thrill of stepping off the ledges of previous paradigms to see what new support systems open up beneath us.

Every day, we get to blend new technologies into the world around us. Big data helps us gain new insight into people's needs, which in turn fuels new design that facilitates healthy and sustainable workflows and social interactions. All the more, we are called to create new virtual reality visions of the future, which anticipate the 'what if's' and puts the unknowns at ease. We get to reimagine energy as we know it and tinker with a thousand unimaginable ways to address some of the single-most important issues of our day.

If we are going to remain agile and imaginative in our approach to urban co-creation and problem solving, then engineering needs to stay fun and occasionally open to failure. If we subscribe to methodologies that resist change and reward bottom line only, we will dangerously stay too neatly within the lines.

We pen the story

Whether it be a mass transit system, a power system, a water network or a building, engineers are asking the question, 'how will this infrastructure be relevant in the future?' We have the privilege to keep reshaping life into systems and spaces that breed more life. Every day we are faced with the opportunity to look at issues through new lenses and improve upon historic archetypes.

Take the example of **Elon Musk**, whose invention of the **Tesla** electric car presents itself like a lifeline to the sinking ship we call today's fossil fuel-dependent **automotive industry**. His passion to reduce global warming has pushed open major doors in **solar energy** and cracked the ceiling of our paradigms, even to include outer space. Thanks to Musk's **SpaceX program**, some of us are now googling how to grow vegetables on Mars.

Good engineers steward safe boundaries. Great engineers push them wider to the benefit of society. Game changers such as **Mark Zuckerberg** have altered the stakes of social engagement worldwide through Facebook's far-reaching and immediate ability to connect people around the world. **IDEO** is pioneering concepts around people at the centre of design and economies of circular value. And because they have a sobering understanding of the responsibility which goes hand-in-hand with crafting community, they don't easily back down.

Zuckerberg has used his unique position to pledge 99% of his lifetime Facebook shares (worth about $45 billion) to **"advance human potential and promote equality in areas such as health, education, scientific research and energy"**. As "impatient optimists working to reduce inequity", the **Gates Foundation** has so far given away **$35 billion** to 'take on the really tough problems' of hunger, disease and poverty. At their core, engineers are pioneers who create platforms to propel humanity upward and onward.

We can create it!

Engineering is a constant exercise in diagnosis and treatment. We identify the pain points of society; we prescribe the remedies; and then we even get to deliver the solutions ourselves. Every day the hand of the engineer provides enormous **benefit to communities** whether that be in the form of a surgeon performing groundbreaking fibre optic treatment, or something as commonplace these days as an overseas Skype call using broadband or fibre network.

Biomedical engineers are developing artificial hearts and giving amputees a new spring in their step. And leaders of science, technology and innovation are carrying the keys to unlocking poverty alleviation and meeting the basic **human needs of adequate food**, clean drinking water, sanitation, good health provision, shelter and education.

Through tight collaboration with government, business leaders, academic institutions and the public at large, we can lead true change by painting wide-stroke solutions over societal problems. We carry cutting edge solutions and skills that embed the systems and smart technologies carving out our future urban ecosystems. It's to everyone's detriment when we fail to step up and lead.

The **ERA Foundation** encourages engineers "to be proud to leave their mark… to shake off their 'behind the scenes' identities and become ambassadors that talk proudly about the full range of work and sectors they are involved in." This is not a time for false humility; it's a time to let our capes fly. Engineering is far more than a job. It's a way of seeing the world and believing we can improve upon it. The degree to which **we own our superhero status in the collective story** is the degree to which we all win.

THE DEVELOPING NATIONS DON'T NEED MORE HANDOUTS, THEY NEED ROADS!

Portia Derby

"IF YOU BUILD IT, THEY WILL COME".

These were the illustrious words on the wind that inspired an Iowa farmer in the 1989 blockbuster, Field of Dreams, to level corn and plant a baseball diamond for resurrected legends in its stead. But the words that brought a Chicago White Sox team back from the dead are not only good for a night of 'Totally 80s: Trivial Pursuit'. They're just as handy in the boardrooms of world economic development.

If you build a road, they will also come.

That's essentially the big idea that built the **Silk Road** and shaped the geopolitical terrain of central Asia. It's the motive behind turnpike construction in 19th century industrial America. And it's still one of the greatest catalysts for growth within the developing world today. As our technologies continue to evolve and re-craft our infrastructure solutions, the strategies to stimulate economies and untap new markets can easily appear daunting and dizzying in complexity. But history and basic economic theory could argue that the same steady logic which built the industrialised world still applies today. Build a corridor, and you by default help build a nation.

Stuck in the mud

There is a kingpin theory of economics that says movement is money. The broader your market, the greater your chance to expand your business and pump more money back into the local economy. More access, more connectivity; and more connectivity, more influence and profitability.

Geographical isolation, on the other hand, hinders economic growth and roadblocks innovative momentum. According to a **UN-Habitat study** on poverty and sustainable transport, the majority of rural Africa does not live within five kilometres of an all-weather road. In Latin America, roads may be slightly more prolific but their unpaved and unkempt conditions (representing **78% of the region's total road network**) often render them unusable. The result is a type of economic paralysis that forces local markets to stay small, expensive and vulnerable to regional conditions.

Changing mindsets around the poor

Management scholar **CK Prahalad** argues that the degree to which we can **unlock the market potential of these remote and under-invested communities** will determine our future economic prosperity. He says our most potent entrepreneurial talent and consumer opportunities is found among the two-thirds of the world's population living at or near the poverty line. These four billion people living 'at the **bottom of the [financial] pyramid**' are brimming with tremendous opportunity, skills, and knowledge that in fact make them the engine for the next round of global trade and prosperity.

Our most potent entrepreneurial talent and consumer opportunities is found among the two-thirds of the world's population living at or near the poverty line."If we stop thinking of the poor as victims or as a burden and start recognising them as resilient and creative entrepreneurs as well as value conscious consumers, a whole new world of opportunity will open up," says Prahalad.

This type of action requires a massive shift in mindset, in which the developed world no longer sees its role as donors or mentors, but as potential colleagues and consumers on equal footing. The assumption here is that 'everybody, not just the elite' will take part in the story of globalisation and reap its rewards.

For this to happen, a change in posture is needed, one that offers a handshake over a handout. The concept of fighting poverty with profitability is intriguing; it overrides the classic language of international development that teems with top down terminology around teaching communities 'how to fish'. Essentially Prahalad is saying, "they've been fishing all along. We need to connect them to bigger ports."

The visible and invisible roads

So, when it comes to uncorking and connecting this latent potential of disconnected communities within the developing world, a good **road network** is a good place to begin.

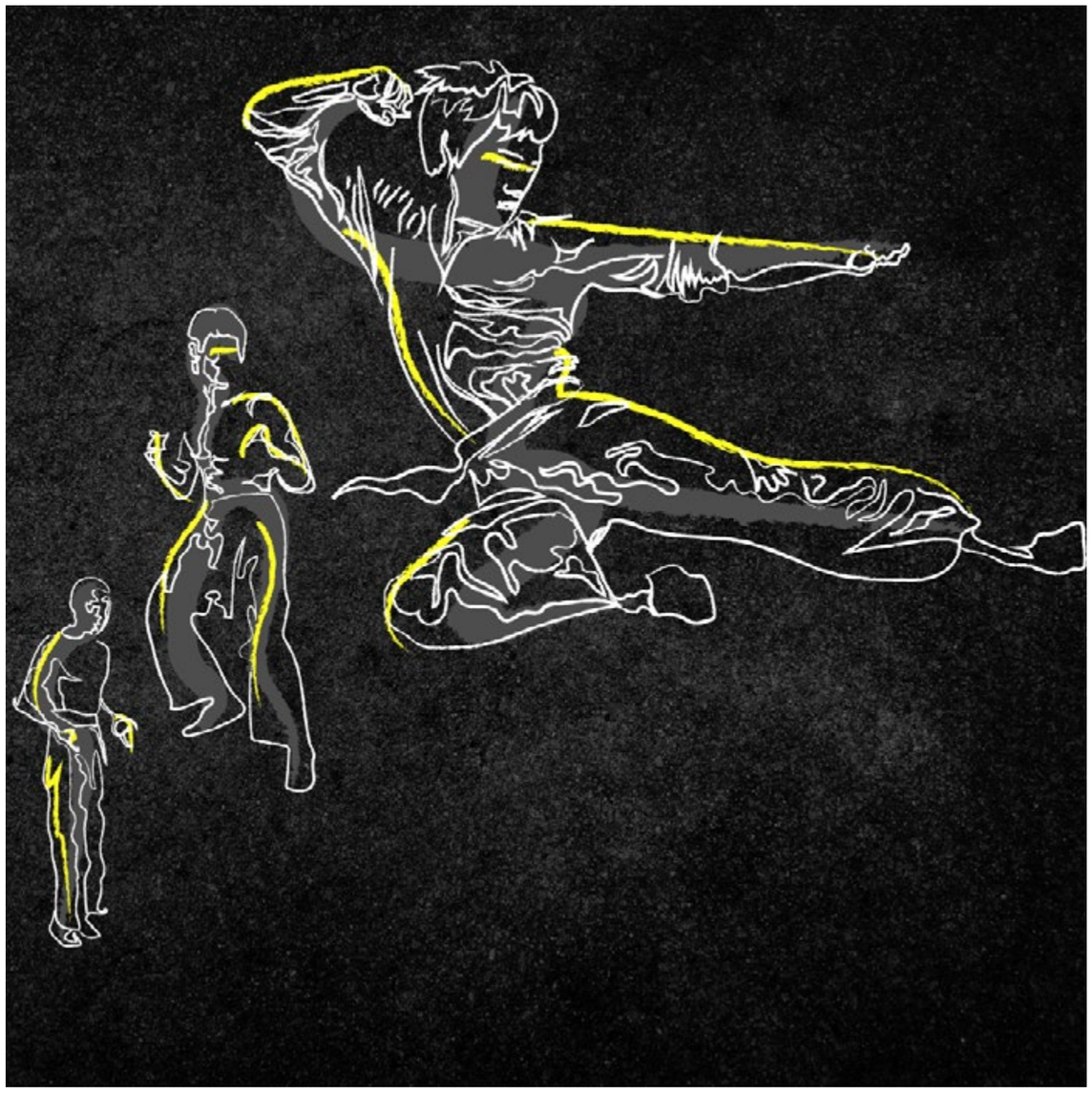
Suddenly, agricultural communities have **new markets for buying and trading**; the ease of travel ups production and lowers freight costs; human connectedness increases local employment; and profitability boosts standards of living. Shop owners can reduce prices, thanks to lower import costs, and ease the burden on local consumers. There's now new space for entrepreneurial innovation to run. And there's impetus for consumers to start buying better quality cars.

Or, roadways could take on less visceral forms, linking isolated communities to markets that rely primarily on the digital movement of data. Countries only starting with industrialisation may be more poised to **leapfrog expensive and traditional infrastructure** and go straight into more efficient, digital forms. Information highways can potentially unlock profound market value, even if the asphalt is never laid. After all, corridors of the future are becoming all the more invisible as the future unfolds.

Roads facilitate growth and health, knowledge and equality all cornerstone elements of civil society on which humanity aims to build. They are pipelines for empowerment and mobility catalytic forms of economic opportunity within rural and under-developed areas. They are also increasingly invisible and potentially more profound as a pathway out of poverty. Both forms are needed as hard-hitting solutions in the arena of international development. Asphalt or from analogue to digital, the simple lessons of history remain. If all else fails, start by building a road. You'll let out the first ripple of many.

WHOEVER SAID ENGINEERS CAN'T GET THEIR BLACK BELTS TOO?

Matt Gurr



Technically it's just a strip of cloth. A belt that wraps around the waist. In the West, it represents a sense of magical mysticism and extraordinary esoteric power. But to the student and the Sensei, the black belt is an almost sacred symbol of sweat, injury and adversity overcome by sheer perseverance.

More than a physical feat, the belt speaks to the student's discipline, focus, teachability and mental strength – the stuff that only time and courage will mould into the human spirit. The day that the black knot is ceremonially tugged tight marks a tremendous achievement, when the human will has managed to overcome the mind and body.

But it isn't simply about achieving a set 'level' of fitness or competence. A 'black belt' is far more symbolic of a process, not just an achievement. The black belt is symbolic of continuous improvement, or '**Kaizen**' (often called LEAN in the West) – a philosophy deeply steeped in Asian history. Could business borrow from their ancient forms of martial arts? With so much of the new on our Twitter horizons, could we use the old for fresh inspiration?

In a tumultuous time fraught with the enemies of complacency, the engineer of today would do well to consider the lessons of these ancient forms. 'Black belt thinking' may be the distinguishing feature that separates the engineer who rises with poetic motion from **the one stuck in yesterday's mud**. What **lessons in leadership** can we take from these ancient art forms?

Mastery comes from continuous practice

Hollywood's 2010 Karate Kid ends with a dazzling display of airborne implausibility that awards young Dre Parker the champion title and Jackie Chan's mystic nod of approval. But it had its beginnings in a jacket that, for days and weeks on end, is dropped, picked up, put on, taken off and hung up…all to be repeated again. It is a tedious, unrewarding and nonsensical exercise that is performed under stars or torrential downpours, with no end in sight – until the day when those specific motions are revealed as the foundations of kung fu. What seemed insignificant and unremarkable at the time ultimately empowered the young student and catalysed his performance from **mediocrity to mastery**.

Unfortunately, in a fast evolving industry, words like 'repetition' and 'faithfulness' don't tweet sexy in the same way that 'innovation' does. But one's experience is immeasurably valuable when combined with an attitude of consistent teachability and entrepreneurial curiosity.

Fundamental skills such as maximum demand or heat load calculations can become key drivers to new insights and innovation. With these foundations, seasoned engineers are

poised to push the perimeters of knowledge and become masters in their respective fields. These areas of expertise are essential when moving into new areas of practice, so that we remain sharp and relevant to leading-edge design.

Practice and plan strategies for success

The best martial artists always have a plan to overcome. Intuitive and acute anticipation of the opponent's next move safeguards the chance of eventually walking out alive. The artist must actively plan for different scenarios and develop strategies accordingly. When your opponent is coming at you fast, having a well-rehearsed plan can make all the difference between winning and losing.

As an engineer, having the right skills is only part of the imperative. **Having a game plan** to synthesise these skills is equally indispensable. Increasingly, strategic leaders are moving away from traditional business models driven by product and sales, and harnessing thought leadership and knowledge sharing as an effective corporate growth strategy.

Companies are taking an open-handed approach to fuelling business growth, by putting all their best practices and lessons learned on the table for clients and competitors to assess and apply. **Corporations are now rewriting the rules of engagement** – sharing their best ideas and talent, rather than tightening the lid on their resources – in order to create collective wins. This type of counter-intuition not only requires pluck and a handful of humility; it demands a certain finesse in strategy setting and vision casting.

Remain humble and never assume mastery

It takes one solid throwdown from a senior student to be reminded – **black belts don't come with force fields**. Wearing an emblem of martial art mastery is not so much a statement of superiority, as it is a commitment to continue learning.

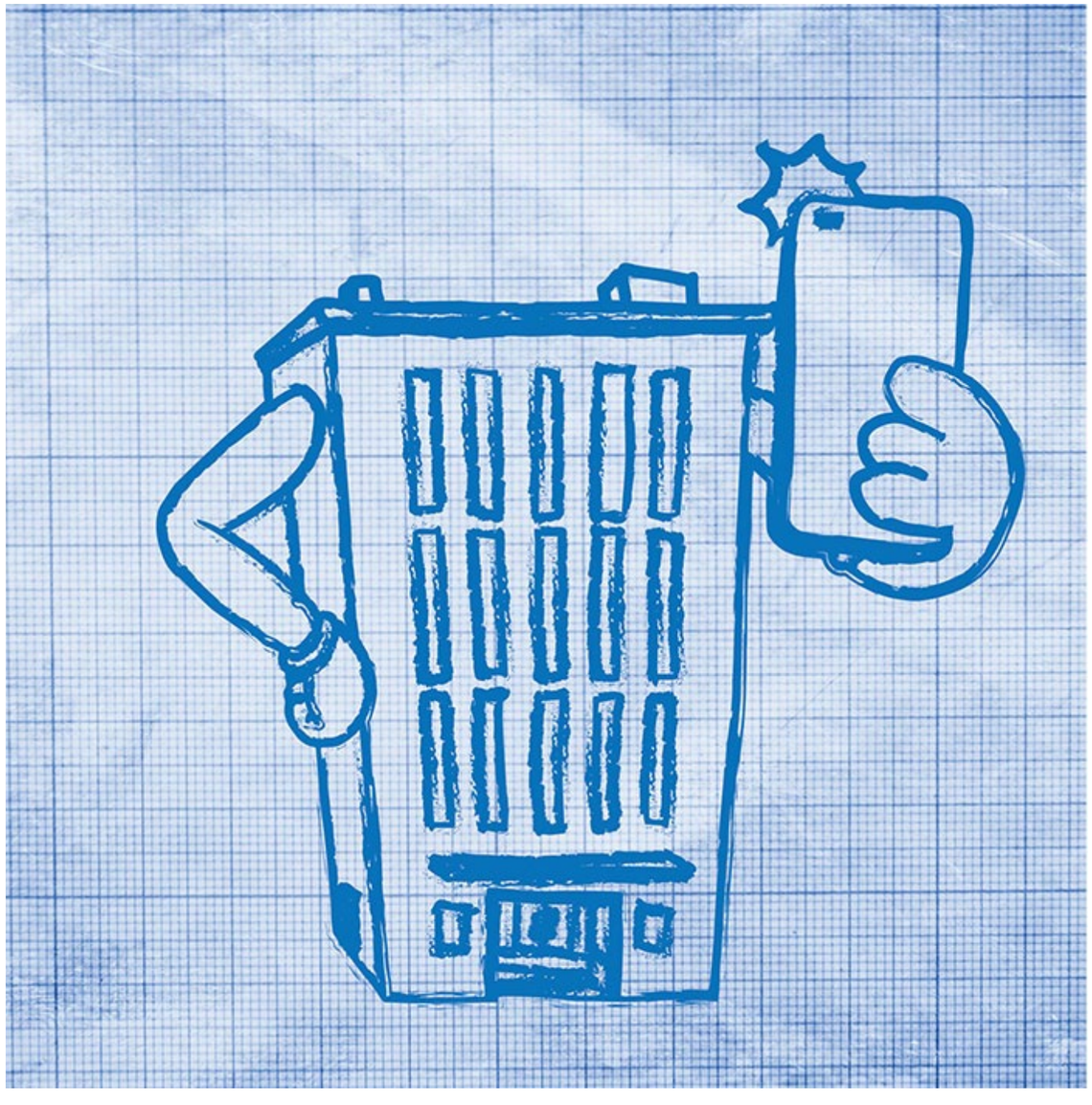
Research is proving that humility applies equally to the world outside the dojo. A **Harvard study** has found that managers with altruistic behaviour such as self-awareness, honesty and humility are better leaders who produce better results in the long run. Their teams tend to be more innovative and proactive, **engaged and supportive of their colleagues**, as they feel heard and appreciated in an environment that encourages transparency and appreciation.

Humble leadership sets a standard of continual learning, as young engineers and graduates are given space to complement the innovative process with new insights and perspectives. **Collaboration** finds scintillating traction, as the resident 'experts' are willing to engage on equal standing with tomorrow's pioneers.

Earning a black belt in engineering is more a statement of character than of prowess. Esoteric knowledge and specialised skills are needed, but they won't tip the scales over to excellence in and of themselves. A great engineer understands that innovation is not a matter of knowledge alone. Invention is a by-product of passion and perseverance, of servant leadership and critical self-review. Anything less than this is no longer good enough. In a time of volatile and thrilling change, we cannot afford to wear the beginner's white belt forever.

PROJECT APPROVALS NEED TO STEP INTO THE DIGITAL AGE

Kylie Cochrane



Our current world is more connected than ever before, thanks to the digital highways which under-arch and override our societal landscapes. The Internet and smart technology are laying fresh tracks into uncharted territories. Opportunities abound for streamlining processes and reducing cost. People can be connected and opinions gathered at a fraction of the time, drastically reducing cost and enhancing engagement. With all of this potential, isn't it about time that the project approval and **community consultation process stepped squarely into the digital age** for the benefit of all?

For project owners, **community consultation is a critical** and a valuable part of the overall project approval process. However, it is time-consuming. Project developers all have stories about the impact of approvals and consultation on their project viability. Delays, appeals and redesigns all add time and cost, which can stifle investment and stall economic buoyancy. As our economies nervously navigate their way through the post GFC fallout, added time and cost are the last thing we need in a world that is desperate for new **infrastructure**.

On the flip side, who wants a monstrosity built next to them? Who wants something imposed on their neighbourhood and its quality of life? Don't most people want to be asked what they think and be given the opportunity to provide their opinion?

Two sides of a coin that, at face value, seem inexorably at odds. But does it have to be that way? In an age of big data, selfies, tweets and immersive visualisation, could digital engagement bridge the gap between divided opinions or at the very least move the dial on timelines so that the future arrives quicker than when it is expected?

Could the advent of all things digital streamline engagement? If community engagement went from analogue to digital – would approvals be fast-tracked; opinions synthesised faster; and project approval accelerated?

Smart project owners and **governments** are realising that digital strategies can supplement the traditional consultation process, with potentially game-changing results.

Apps as multiple stakeholder mobilisers

With digital rewriting our points of connection; the average individual is now empowered to have an equal say in the creation of a shared space. The **upgrade of Wynyard Station** in Sydney is a case in point. Using a custom smartphone app to communicate with its time-poor and tech-savvy audience, the app offered its users a glimpse into the future look and feel of the station during the design phase. The app not only generated public support;

it resolved security concerns and allowed the team to regularly communicate with a large audience via push notifications.

Taken a step further, photo realistic visualisations can now be produced in a matter of days using powerful gaming engines. These would give a project's end-user (the community) virtual 'driveability' of a project model long before construction.

Gaming closes the gap on comms

And whoever knew safety hazard education could be fun? **Ausgrid's vegetation management community relations program** found a way of turning a lesson on vegetation management into a virtual game of arson. Using augmented reality (AR) helped the project team to demonstrate that precaution should be taken when planting trees around power lines.

Through AR goggles, participants were able to 'see' a virtual tree and virtual power line in the 'real world'. Another participant then moved specifically designed markers linked to these virtual elements, setting the virtual tree on fire if placed too close to the virtual powerline. The game was a success – translating a simple message about safety through activity-based engagement.

Selfies to draw in new audiences

In addition, let's not forget the most potent sociological tool of our day: the selfie. A recent survey posing three questions to its participants and asking them to respond with a yes or no, à la selfie style, cutting out cumbersome paper trails and data entry to achieve real-time reporting and reach a formerly excluded group of the population.

Failing to think beyond our former paradigms and neglecting to redesign our community engagement processes, amplified by modern technology, could mean that we are overlooking powerful opportunities for streamlining project socialisation and acceptance. For those stuck in the past, the only game they'll be playing is one of 'catch up' down the line.

What other digital tools have you seen work well in community consultation?

RISK – CAN WE PREDICT THE UNPREDICTABLE? SHOULD WE?

Simon van Wyk

Infrastructure underpins national economies. Businesses, industries and communities all intrinsically rely on power, water or telecommunications networks as their lifeblood for operation. They all rely on **road** and **rail networks** to facilitate the movement of goods and people – movement in our modern day trading world is as good as money.

Most businesses and communities take these underlying systems for granted. They will always be there, won't they? Is 'always' a dangerous assumption? Tasmania, an idyllic island which is home to over 500 000 people, might answer: Yes.

Over the last century, Tasmania has been largely reliant on its own hydroelectrical generation. When Basslink, an undersea cable connecting the Tasmanian grid to the Australian mainland, failed on 22 December 2015, it led to a power outage from which Tasmania still hasn't recovered. At the same time, Tasmania was suffering from a major drought, which meant that its capacity for generating hydroelectrical power was greatly diminished.

Tasmania's engineering systems, on which the entire State relied, would have been designed for a certain level of resilience. In engineering speak: a 1:100 year event. But what happens when these rare events happen cumulatively? One of these 'one in a hundred year' events puts a massive strain on an area's **infrastructure and systems**, but two simultaneous and interconnected events is disastrous. In their case, their systems came to a grinding halt.

RETHINKING "THIS WILL NEVER HAPPEN TO US"

A more pertinent question to pose might be: are these major events happening more frequently as a result of human influence? And if they are, do businesses need to rethink their "this will never happen to us" plans?

Tasmania is not alone...The January 2011 Brisbane floods were some of the most devastating in Australian history: beginning with bad state-wide flooding in December, the situation escalated dramatically when a monsoon arrived on Christmas Eve from the Coral Sea, culminating in the Brisbane River's banks bursting on 11 January. This rapid sequence of disastrous events caused 35 fatalities, affected over 200 000 people throughout Queensland and caused damage of around AUD2.4 billion.

As both natural hazards and human-induced **disasters** occur more and more frequently, it's imperative that we get better at **harnessing emerging digital technologies** to foresee and fend them off. Is a risk management strategy possible for the unpredictable nature of disasters – and, if it is, how might we integrate it into both our operations and designs?

Making peace with uncertainty

Modern day risk analyst, statistician and essayist **Nassim Nicholas Taleb**, believes that in today's evolving world, uncertainty is on the rise with increasing severity. Because rare events are impossible to predict, he argues that we need to make peace with this uncertainty and to reduce our negative exposure.

What would this acceptance mean to business owners, governments, insurance agencies and the general public? Should we recalibrate our design criteria on the basis that the world is shifting and 'one in a hundred year events' are now happening once a decade?

Architecting risk buoyancy

We must strive for a world in which unknowns can be identified, assessed, evaluated and this information then utilised to improve the end product. Managing risk is about leveraging predictive capabilities that extend to the unknown, so that uncertainty is replaced with expectancy. This, in essence, is called 'risk buoyancy'.

Designing for the unexpected

Imagine a world where buildings can regularly withstand the blows of a big-scale disaster, because the design accounted for a typical one in a hundred year event to wreak havoc every decade. Although not, as of yet, commonplace, more and more examples are in evidence:

San Francisco's multibillion dollar Seismic Retrofit Program allows the region's lifeline infrastructure and housing stock to rebound more quickly from future seismic activity. Five years after the earthquake, **Christchurch has concentrated on rebuilding** a **resilient city** focused on low damage design which can, quite literally, 'bounce back' faster after any major incident. Japan has similarly prepared for future earthquakes; New Orleans' USD14.5 billion network of levees, floodwalls and pumps guarantee to ward off destruction from another event similar to Hurricane Katrina; and Copenhagen is building parks that turn into ponds during extreme rainfall events.

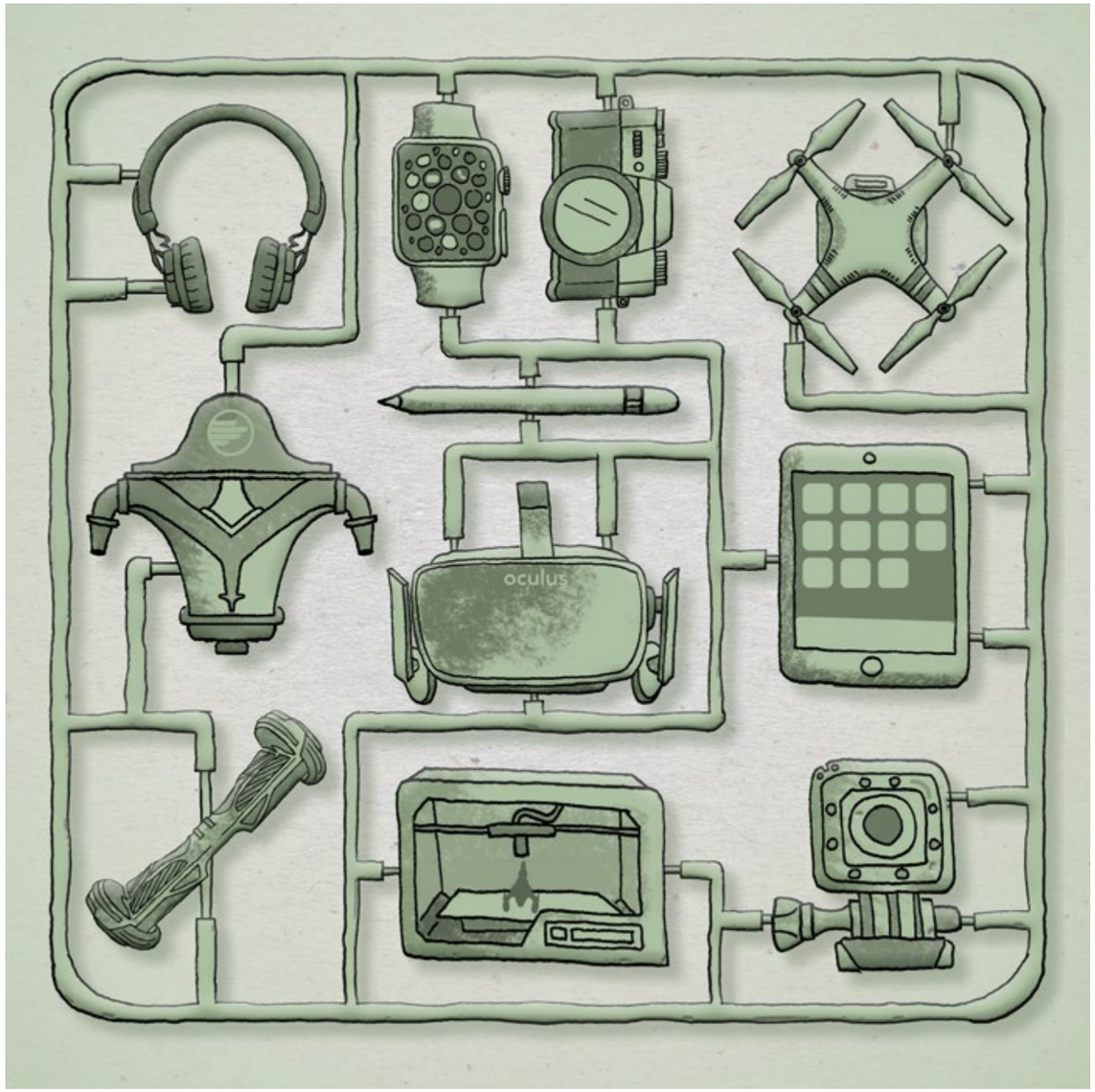
In our journey of predicting the unpredictable, we must seek out these examples of robust or anti-fragile architecting as examples of positive risk mitigation. Future risk-based thinking needs to consider the multiscalar and multidimensional attributes that, in combination, create uncertainty.

In an ever-changing world, radically underscored by uncertainty, is it possible to eliminate all unpredictability by determining our unknowns? One thing we can be sure of is that we will never know the answer. But we do know that we want to create an environment where unforeseen factors can be integrated into the creative process to provide end users with an asset that is risk buoyant.

Perhaps we should change our traditional design approach to consider the 1:100 year event to be a dice with a hundred sides that is thrown every year. Every time, there is a 1% chance of the event occurring. Every time, it reminds us there is a risk of it happening more than once in a hundred years. That way, not even a 'one in a hundred year event' will catch us off guard. We would already have anticipated it and, more importantly, put in place mechanisms of thriving beyond its potential devastation.

YOU'RE TOO CREATIVE TO BE AN ENGINEER – AND OTHER MYTHS...

Liam Hayes



The engineers of yesteryear spent hours painstakingly drawing the intricacies of designs for bridges, buildings and other infrastructure. With slide rules and log tables as the tools of trade, engineers navigated the boundaries of physics and mathematics to bring the iconic forms of their day to life.

The engineer 2.0 then emerged **using CAD and other digital tools** to do the same, faster and with greater accuracy. They solved increasingly more complex questions, with the results being even more sophisticated and efficient infrastructure to satisfy the needs of ever-growing populations.

As many of these digital tools become more advanced and automated, and even self-learning, the engineer must now evolve even further to ensure their relevance in a digital economy. Standing at the dawn of an age of new intelligence, could the machines they helped design actually disrupt the engineers that created them? Is this a cruel irony of cannibalising your own profession and, if so, **what does the next generation of engineers actually look like?**

"What do you want to be when you leave school?" In the past, the traditional, most 'respectable' answer to this important question was 'a doctor' or 'a lawyer'. A career which required 'creativity' was frowned upon, risky and certainly not lucrative. But all of this is changing. It has to change. Tomorrow's economy will be one in which **creativity isn't the preserve of the artists, designers or writers**. The traditionally 'left-brained', 'conservative' and 'safe' will require a very different toolkit to survive, and thrive. Defying stereotypes is fast becoming an essential skill of employable graduates, including engineers.

The widely supported **#ILookLikeAnEngineer campaign** was a powerful demonstration of the fact that even in 2016, our definition of what those who work in tech should look (and act) like hasn't evolved enough. A year ago, Isis Wenger, a female platform engineer, was featured in a recruitment campaign which sparked derisive comments from complete strangers and exposed hidden assumptions about what an engineer should look (and act) like.

Isis went on to issue a call to engineers and those in the tech industry far and wide: "Do you not fit the 'cookie-cutter' mould of what people believe engineers should look like? I invite you to help spread the word and help us redefine 'what an engineer should look like'." With that, the hashtag #ILookLikeAnEngineer" was born, with **thousands posting pictures of themselves across social media** in order to **defy stereotypical formats**.

It is clear that an evolution is needed, but what do we need to change? What will engineering look like in the future?

Engineering must become more important

While **digital disruption** might be rendering certain aspects of engineering obsolete, the profession has never before been as critical to human progress as it is today. Singaporean engineer Chade-Meng Tan writes in his article **Wanted: Jolly good engineers** that "The word 'engineer' comes from the Latin words 'ingeniare' and 'ingenium'. Simply put, an engineer is someone who uses his or her ingenuity…to change the world. Engineers solve some of the world's toughest problems."

He goes on to say that like every other metropolis in the world, Singapore faces many challenges: **climate change**, **energy** scarcity, land scarcity, to name a few. As they reinvest the time gained from the help of digital tools, engineers will solve these. It will be engineers who are going to figure out how to incorporate **artificial intelligence**, robotics and wearable devices into our infrastructure and communities to propel us towards **smart nation status**, and even smart world.

It will be engineers who will be behind efforts to curtail emissions and drive energy efficiency after ratification of the climate change agreement. It will be engineers who will figure out **how to comfortably fit a growing population into limited land space**.

Engineers need to stop solving problems

Engineers are trained to be good problem-solvers, but too often they wait for people to tell them about the problem that needs to be solved. Tomorrow's clients (and communities) will look for unconventional thinkers who will look them in the eye and say 'You've got an issue, but you've identified the problem wrong'. These unconventional thinkers will have a desire to challenge the norm and shape ideas in the pursuit of what might be possible **if we forget former paradigms and ways of thinking**. They will have an ability to pull back the lens for clients seeking to invest in the future.

Engineers will need to embrace a different toolkit

While a steady hand and straight lines differentiated the draughtsperson of yesteryear, times are changing. Fast forward to 2020, and sought-after engineering companies may have a team of game developers on staff to **facilitate better community engagement**. They'll have an army of graphic designers developing inputs for 3D and augmented reality products; and they may even employ professional artists who can bring to life visions of the future as inputs into infrastructure designs. Successful companies will be those who invest in their staff as they hone **the skills** clients are already telling them they require in future.

The MBA has recently been redesigned to face the modern world. The volatility and uncertainty in business is best navigated using the **theories of design**. Isn't it about time that engineering schools similarly reinvented themselves?

Where many of the basic functions of engineering will be performed by a self-learning computer in future, and not an engineer, the engineer will have to become an interpreter and translator of new complex technologies into business applications. This will demand creativity as a core skill and will see **the engineer creatively apply technology** to solve an unmet need. Creativity as an engineer is no longer an oxymoron, but the new secret ingredient to keeping engineers where we as a society need them... finding the future for us all.

Engineers have a very exciting future ahead, but it's a future that is in jeopardy. Unless **engineering companies evolve**, 'an engineer' will cease to be a viable answer to the question: "What do you want to be when you leave school?" An engineer's time to fight back is now, and it is tenacious, relentless problem finding and a different toolkit that will lead to a brighter future.

"ONCE UPON A TIME," SAID THE ENGINEER...

Kourosh Kayvani

The story of humankind is essentially one fantastic read, peppered with drama, tragedy and hair-raising exploits of heroism. From the first rock paintings through to Facebook, humanity has had a penchant for posting its legacy on walls. The oral and written word has always been one of our most powerful tools to reflect and reimagine our world and the role we play within it.

"All great literature is one of two stories; a man goes on a journey or a stranger comes to town." If Leo Tolstoy's words are true, then engineers have the world's best stories that

are yet to be written. A good engineer is a classic sojourner, constantly navigating ideas into reality.

And yet, in spite of how essential engineering is to human society, as a profession it remains largely an untold tale, as most engineers don't recognise there is a story that needs telling – one in which their profession is the hero. When asked about our projects, we speak in the technical when we should speak in the emotional. Our legacies should be celebrated from the rooftops of the city skylines we have helped to build.

Engineers would do well to upskill themselves and embrace those most famous words: "Let me tell you a story..." Without these words, you could be the best engineer in the world, but unless you can get people to understand what you have done and the value you have created, then nobody will ever know.

Our story is robust and essential to the big picture narrative, but we need to know how to share it in order to foster rich communication and **meaningful collaboration** going forward. Our expertise needs to find a new language that is captivating, relevant and persuasive to listening ears.

The power of the narrative

Like never before, now is the time for engineers to find their voice and tell stories...not just stories about where we have come from, but stories about where we are heading. As technologists, engineers are best placed to understand what emerging technologies will mean to people's lives. Most people are guessing what a world with autonomous vehicles or blockchain or artificial intelligence will look like and mean. As the creators of these technologies, engineers can paint that picture and reassure people of the benefits that will be created. But to do so, they have to find their own voice. They have to move from "Once upon a time..." to "Just imagine a future where..."

In today's world, the engineer often plays supporting roles in the story of design, sitting back to give the traditional spokesperson centre stage. But our reticence impoverishes the process; our expertise and knowledge are critical to the collective narrative. Engineers should be the custodians of the design narrative. This is a narrative about the future.

In the era that ensued the great industrial revolutions of the pasts, iconic engineers such as Isambard K Brunel and Gustav Eiffel were the custodians of design narrative. We need to reimagine a similar role for ourselves in this digital revolution age. Looking forward, 'Engineering-led Design' suggests that our best ideas are yet to come. This highly collaborative process hinges on a depth and breadth of expertise working together to tell a much bigger story. As we work with government and economic leaders to reimagine our physical spaces and infrastructure, engineers need to lead these conversations.

Lessons in leadership

A century ago, engineers like Brunel and Eiffel were living through a pivotal point of change. The emergence of new technologies stimulated them not to shrink back, but to explore new creative and dazzling horizons. These engineers were leaders in the application of new material technologies, construction techniques and ways of thinking about design. They were the trailblazers. Our challenge is to redefine the role we play as engineers, in particular to sit at the top of the innovation chain of design. Just as Brunel or Eiffel were creators of solutions, not technical functionaries who delivered designs others had conceptualised, we need to trailblaze and excel.

In today's terms, Elon Musk changed the energy debate, leading the agenda as opposed to following political direction. He has transformed the challenge of stabilising the national grid into an engineering-led debate.

People before product

Engineers are at the forefront of the innovations that help solve the most complex challenges facing humanity and make the most ambitious scientific endeavours possible. Our work matters because it has exponential impact on society. We carry fundamental knowledge and skills that provide the framework for how the world works, and we intrinsically understand how to correlate and synthesise these processes to facilitate human progress.

But the value we offer as engineers is not only in the products we co-design. Our value lies in the knowledge we can unlock in others. Part of our storytelling journey is to translate information into wisdom, and to bring our problem-solving processes to the human-centric values they create, transcending understandings of the world and our place within it. Knowing how it all works is not enough. It's about the people and communities a particular design works for.

We need to work together to evolve building typologies beyond the mundane and into new territory. **Brisbane's new Ferry Terminals** have become synonymous with a **forward-looking attitude** to the design of **public transport** infrastructure and enhance commuters' experience of and connection to the city's key natural feature — its river.

The packaging also matters

In order to make the narrative memorable, the message must be simple. Why is this model of sustainable design important to the public? How will this breakthrough technology **propel innovation to higher standards of health and safety**? The story must also come with faces and names, emphasising the interconnectedness between our built environments and the occupants they serve. Authentic and fleshy, honest and on the ground, the engineer's story is ultimately about people. The tools and technologies which we master are merely the scaffolding, but the design brief is humanity itself.

The first known engineer is said to be Imhotep, whose invention of the Step Pyramid was so transcendent and inspiring that Ancient Egypt decided to pay him the compliment of making him a god for the next 3200 years. Idolatry is no longer up for debate, but aspiration is. Engineers do the creative process no favours by downplaying our capacity to captain thought leadership and drive future change. Our contribution weaves through the major themes and plot lines of humankind's entire story. It's time we start sharing it. If engineering is to move on from being an 'invisible profession' – we must understand our pivotal role; and then make friends with the words "Once upon a time..."

VIRTUAL AND PHYSICAL WORLDS COLLIDING TO CALM CHAOS

Keri Niven

Geospatial information could allow us to build out the eco-system of the virtual world to optimise physical interactions creating better urban environments and designs.

In today's digital world, it's possible to 'exist' in many places at once. Geospatial data, which is data used to describe the location of things beneath, on or above the earth's surface, makes it possible for objects to exist in real life and virtually. Geospatial systems allow for the capturing of data on a massive scale, and this digital world could co-exist in parallel to the real world.

In our real world, only objects in close proximity to each other interact with each other; and often, it is only a small portion of their characteristics that 'collide'. In the digital world, however, that's not the case. One object 'understands' the properties of the other object.

Imagine for a moment that these two worlds could interact...what would happen if these parallel universes collided? Could the digital world enhance interactions in the physical world? Could they help improve them, even?

Improving our interactions

Many problems exist because of a lack of interaction between objects. A car doesn't know that a pedestrian is crossing the road. **A room doesn't know how many people are actually in it**. A road doesn't know how many cars are on it or the number of passengers in each car. However, a digital world using a geospatial platform can. And if it does, it could start to order/organise these things and look for ways to optimise physical interactions.

If a GPS system knew where a car was; and a person was wearing an intelligent device (a phone, a fitbit etc.), then the person's location would also be known and the car would automatically know that they are crossing a road, even if they might be around a bend in the road or, out of sight or, if this were to happen at night.

Is geospatial information the elixir for improving the design of cities and their management? Is it the powerful connection that could allow us to build out the eco-system of the virtual world using trillions and trillions of pieces of information so that we're able to enhance interoperability between the physical and virtual in future?

How far can we push the boundaries of utilising geospatial information to create better urban environments and designs? How do we leverage digital technologies, and the masses of data they produce, and harness this powerful resource to design smarter, more integrated and rewarding urban environments?

Smarter future cities

It is likely that our future cities will employ sensors to capture real time aural, environmental, and usage information about how consumers interact with buildings and their precincts, and we will use this information to design an intuitively functional built environment.

Critical infrastructure such as transport networks, health systems, water and sanitation or utilities will be designed using digital awareness so that they can be performance managed, with updates and iterations planned and delivered to cope with growth and varying demand requirements.

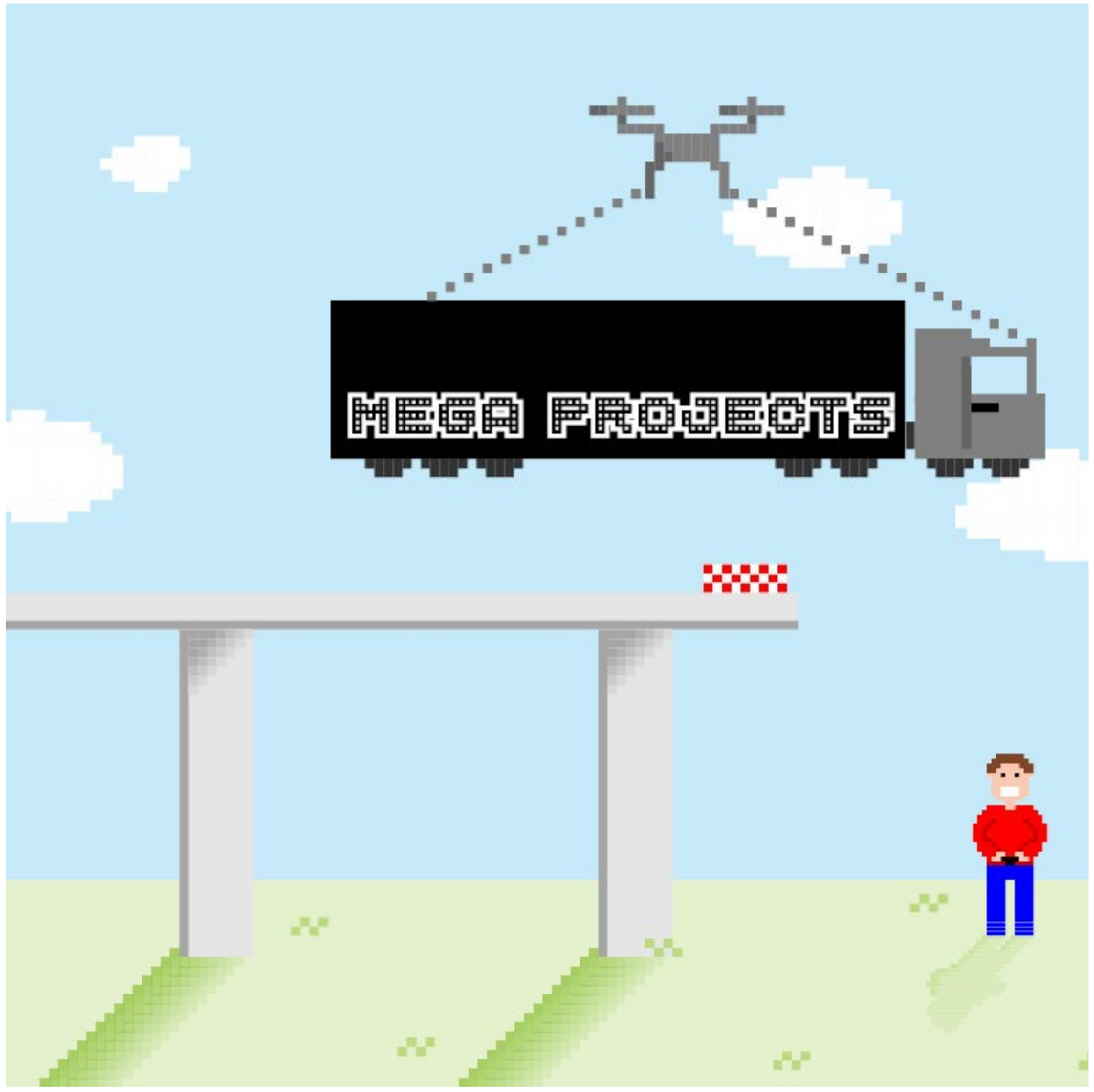
Smart city design in future will be about unifying geospatial technologies to facilitate information capture, storage and manipulation in order to model designs, test scenarios and to improve liveability, operational efficiency and inform future planning. Instant access to this rich data will underpin responses to changes in people movement, emergency scenarios, extreme weather events and supply/demand requirements of the urban environment.

A smart, future city will have at its core a mass of evolving, relational and interoperable data (the virtual world) with which the physical world will be inexorably linked to create new and better cities for all.

And here is the really interesting thing... We are doing this already (on a smaller scale at least). The geospatial technology already exists. Geospatial platforms are now being applied to data capture on very large infrastructure projects, providing substantial benefits to how they are constructed and operated. Scaling up to a network or system level or a community or city level is only a heartbeat away.

MEGA PROJECTS TODAY – ARE WE DARING ENOUGH?

John Mason



In the early hours of 17 November 1869, British Captain George Nares expertly navigated the HMS Newport past the queue of sleeping ships, through the quiet, inky Egyptian air, and slid seamlessly into the front of the line. When dawn broke, the French l'Aigle crew was horrified to find the British Navy would be the first to sail the Suez Canal, a megaproject of its day linking African waterways to the Mediterranean Sea.

What was it that drove Captain Nares to risk such a daring feat? Nothing less than the same stuff of all great people: courage, vision and a reckless perseverance to pioneer what once seemed impossible.

The Suez Canal changed the course of trade and industry forever. Equally audacious was 1914's Panama Canal, which forged alliances and pried the world open. And since 1936, USA's Hoover Dam has supplied a three-state radius with nearly 1.5 million kilowatts of power. In Australia, the Snowy Mountains Hydroelectric Scheme and irrigation complex, commencing in the 1950s, changed the face of agriculture and power generation.

Projects of such ferocious vision and scale reshuffled the deck for nations in the 20th century world economy. Earlier iconic projects such as Big Ben (1859), the Statue of Liberty (1886), the Eiffel Tower (1887), and the London tube network (1863) are today semiotic celebrations of culture and nationalism.

So, the question begs asking, where are today's projects, backed by a vision so bold, that we're willing to travel by night and face the dark?

The Crossrail in the UK may be one. Connecting over 40 stations in London via a high frequency, high capacity service that will make travelling in the capital easier and quicker, and will reduce crowding on London's transport network, its **website** says "Welcome to the future…"

The Square Kilometre Array (SKA) could be another. A global, next-generation radio telescope project involving institutions from over 20 countries, the SKA will be the largest and most capable radio telescope ever constructed and, during its 50+ year lifetime, it will expand our understanding of the universe and drive technological development worldwide.

But what if the projects of tomorrow are off the Google Earth grid and don't bear a plaque at the front gate? What will they look like?

Bits for bricks, bytes for mortar

Our digital landscape is invisible. Muscle and machinery have been replaced with qubits and quantum mechanics. Take the Large Hadron Collider, the world's largest and most

powerful **particle collider** and experimental facility ever built, which will allow physicists to test the predictions of different theories of particle physics and advance human understanding of physical laws. Or France's **International Thermonuclear Experimental Reactor (ITER)** – a collaboration between 35 nations to build a magnetic fusion device that will explore the feasibility of harnessing the same carbon-free energy that powers the stars. These projects and others hold galactic implications to usher in a completely new technological age.

An integrated worksite

The mind of the engineer has always been central to a nation-building story – blending creativity with discipline, **project management** with imagination. Systems without substance are dangerous or uninspiring, at best. The two have always danced in sync.

Collaboration has historically been the name of the game. Now, more than ever, today's megaprojects require multidisciplinary input from the get-go. Lines between invention, innovation, design, risk management, delivery and supply are increasingly blurring; synergy is critical. Companies must keep moving into out-of-depth collaborative processes that celebrate integrated solutions, if we want to embrace effective nation-building endeavours.

The same cement required

The arduous forgings of the Suez and Panama Canals were the most magnificent concatenations of engineering, design and human resource management in their time. Now, several decades later, our tools for managing megaprojects are exceedingly more sophisticated, reaching targets within an inch of their "time, cost, quality" parameters, all in real-time live-streaming dashboards.

What will it then take for projects such as Space X and Hyperloop to launch successfully? Certainly, more refined technology and streamlined project management systems – agreed. But, on a more fundamental level, perhaps it remains the timeless recipe of daring determination and good leadership. Stories as audacious as halting global warming still wait to be written. Every time social responsibility rises to meet the resources, greatness is up for grabs.

WHAT HAPPENS IF OUR TAPS RUN DRY?

Mike Axton & Brian Horton

In the developed world, expectation is nothing less than a right. We open the tap, and we expect clean drinking water to flow. We switch on the lights, and bulbs must illuminate. We swim in waterways that must be safe and free from bacteria. Many resources that are critical for life are taken for granted with little regard as to how the water came to be in the tap or how the power got to the bulb. They are regarded as an entitlement.

But beneath the surface, hidden and unseen, lie literally hundreds of thousands of kilometres of pipes and wires, connected by myriad pumps and valves all pulsing away in real time in the most intricate interconnected web that make our cities habitable. Decades of planning, engineering, sweat and hard labour have been invested to provide these precious commodities and the tide of demand is rising ever higher.

It's often said that we don't realise what we have until it's gone. This is perhaps how some of the 1,7 million residents of South Australia felt the **evening of 29 September 2016**, when severe storms toppled power transmission towers and left their state in darkness. The **infrastructure** that ensured the steady provision and flow of electricity went largely unnoticed and unappreciated, until it was no longer doing its job. The resource supply systems undergirding our cities are currently pressed from numerous sides.

Many cities are facing the real possibility of a perfect storm that will push their infrastructure close to breaking point unless a **radical shift in thinking** is embraced. The confluence of our **insatiable appetite for urbanisation** coupled with an **unpredictable climate**, all superimposed on infrastructure that is decades old, is demanding new thinking.

Ongoing demands for upkeep and expansion have an eye watering price tag. **Water infrastructure** is a multibillion-dollar asset that, if we were currently to overhaul and redo, would likely drain an entire city budget. Sydney alone will spend $2.2 billion on water infrastructure in the next four years. As the tidal wave of urbanisation increases in the coming 20 years, how can **Governments** and water authorities manage the compounding pressures on limited resources, coupled with the adverse effects of climate change? The public purse and taxpayer pool will have to somehow satisfy the living standards and expectations to which communities have become accustomed.

About 40% of the world's population currently lives in water-stressed **areas**. With three billion more people added to the planet by **2050**, water scarcity will soon become a matter of life or death. We face lower and lower tidemarks on our water supplies.

The world of water in a decade's time will see people expect exactly the same level of service (if not better), yet the problem will have grown in complexity. More pipelines are only a part solution. It's a paradigm shift that's called for: the utility authorities will need to change people's behaviour through better digital interaction with water.

If we fail to address the social mindsets driving **city planning** up until now, our problems will only get worse. But if we can use the digital world to sidestep this **static analogue problem**, we can turn crisis into opportunity. Digital technology allows us to step back and 'smart up' around the current cycle of water consumption and wastage. We can begin to see the grim reality of limited supply as the 'dark room' of innovation, whereby bold new ideas can be born to secure societal welfare in future uncertain times.

Moving from point a to point b

Up until now, we have lived in an analogue-based society. Our infrastructure is essentially 'dumb', marked by physical variables that function independently of one another. But as **digitalisation** and mobile technology continue to evolve at pace, the systems and spaces we inhabit will begin to catch up.

Autonomous vehicles represent 1%of the automotive market worldwide today, but autonomous vehicles will secure a 35% advantage by 2040, and that will **continue to rise**. Equally, the flow of water through a city's network of steel and copper waterways will someday be analysed and controlled by smart grids. Our analogue world will become digitised; we will cross over. But where does this leave our clients today, when we stand on the precipice of change and don't see a bridge in sight?

Our job is to build that bridge through **digital transformation**. Our current 'unintelligent' analogue systems must be progressively transformed if we are going to change user behaviours through their enhanced interaction with the precious resource they are consuming. Real-time **predictive analytics** can draw the best out of our limited water supply by offering simple, intuitive, and meaningful insight into unique infrastructure. This, in turn, can be transferred into optimal and cost-effective management strategies that keep the water cycles healthy.

Getting one step ahead

Installing predictive maintenance applications can feel at times like a Herculean task. But statistics alone present a convincing argument that motivates a speedy change of gears into digital integration. While the demand for freshwater is increasing by 64 billion cubic metres annually, the U.S. alone loses **2.1 trillion gallons of treated water** every year due

to pipe breaks, leakages and mismanagement. This economic loss amounts to trillions, with a downward chain reaction on food prices, **health** and sanitation.

Connecting these assets into a real-time monitoring network will reduce the time it takes to discover and solve problems that historically appear only when they literally surface. That same data can be applied as red alerts to motivate preventative maintenance and mitigated **risk into the future**. Smart meters, high-tech leak detection devices and **water data software** are starting to offer sophisticated and granular information on how to maximise profit, impact and environmental **sustainability** within **water management** and distribution systems. The municipalities who are taking heed are gaining traction in the future-ready race.

Contextualising the issue

The 'magnifying glass' or micro approach to problem solving is no longer viable within the context of our interconnected **digital world**. If we don't contextualise the water crisis under the bigger themes of climate change and urbanisation, we could solve a water problem, while unintentionally creating an economic one.

Our water problems will not ultimately be solved by throwing water solutions at them. If we are to ensure this precious commodity's sufficient supply into the future, we have to adopt new ways of thinking around our capability and responsibility to steward the resource. Smart cities are the only solutions with shoulders broad enough to buffer the oncoming high tide of overpopulation.

AUTONOMOUS VEHICLES – HAVE WE REACHED THE END OF THE ROAD?

Mikel Alonso

As predictors of what the future will look like, movies have proven eerily accurate: it's 1966 and Batman uses a remote control to summon the Batmobile. Forward to 2002's Minority Report and autonomous self-driving vehicles weave – almost magically – on magnetic cushions through a futuristic Washington DC. We set our sights on a future that involves autonomous vehicles long ago!

Fiction has become fact. We're standing on the brink of a driving revolution with the race on for which car manufacturer will be the first to roll out a line of completely self-driven vehicles.

At the same time, as urban areas experience a rapid influx of people and population growth, the need for sustainable mass public transport solutions has become ever more urgent.

While car manufacturers drive the autonomous vehicle (AV) revolution, **governments** are currently ploughing billions into mass transit solutions. Which begs the question: Should this **investment be redirected to accelerate the manufacture of AVs**, given that mass transit solutions could be made somewhat redundant once AVs hit the road? Is this a race with only one winner, or is there space for two winners? Will the billions that are being poured in to mass transit become a gross over expenditure when the AV becomes common place?

More importantly, can AVs really reinvent transportation systems?
Driverless vehicles are being touted for their potential to resolve traffic congestion and improve road safety. The current narrative would suggest that car ownership will be a thing of the past as shared AVs take centre stage and older modes of public transport are relegated to the history books.

The story goes that these vehicles will be cheaper, more convenient and will dispense with the need for car parks because they'll be circulating constantly. Traffic jams will be a distant memory too as all the AVs platoon on the freeways.

There is also the economic benefit related to increased productivity. Need to catch up on emails? With your eyes off the road, you can confidently turn your attention to work. This is hands-free at its best.

It certainly sounds like a simple – indefectible even – solution to a convoluted problem.But on closer inspection, how utopian is this future? And is it as 'realistic' as the movies? And what about those billions of dollars being spent right now on mass transit? Is it a wasted investment? What's the real story here?

The existing infrastructure in many urban areas simply cannot support more vehicles on the roads – concurrently, automobile sales are forecast to **climb rapidly** along with a growing middle class who **can afford the luxury**. When the AV hits the market, who's to say it won't exacerbate the existing traffic burden instead of relieving it, putting even more vehicles on the road?

There is also the culture and mindset shift that will be required to get people to adopt AVs. Take the electric car for instance. There's been talk of it for some time now – yet in most of the developed world, the majority of people are still opting for petrol-driven cars.

Without wanting to completely quash the benefits of AVs, here's why it's counterintuitive to hail the advent of the AV as the end of traffic congestion (at least in the short to medium term).

Show me the money
This is a big one: the cost factor. For now, the technology would be out of reach of most people. Various forms of car sharing are predicted to counter this – but how willing will we be to adapt and give up that personal space and autonomy?

Security poses a risk
Countries would need to put some serious governance measures in place to handle AVs. As The Guardian has pointed out, if they ever hit the roads, self-driving cars will prove an **irresistible target for hackers**.

More AVs does not equal less traffic
"The difference in congestion between total chaos and a perfectly ordered driving system – the kind proposed in a future with autonomous vehicles – is only about 33%," write co-authors Brian Christian and Tom Griffiths in "Algorithms to Live By: The Computer Science of Human Decisions".

There's no easy fix. Christian and Griffith sum it up succinctly: "Congestion will always be a problem solvable more by planners and by overall demand than by the decisions of individual drivers, human or computer, selfish or cooperative."

Forging the way

Here's the rub though: there's no quick-fix solution. Focusing on problem-solving, the current situation is akin to slapping a Band-Aid over a festering wound.

AVs alone aren't likely to be the elusive panacea to our transport woes. Not in the foreseeable future at least. These require multifaceted, long-term solutions to a complex problem.

Most cities have **transport** systems that rely on outdated economic models, unintegrated assets and obsolete technology. That's key, because that's exactly where city planners need to focus their energies – on conceptualising innovative research, carefully considering benefit-cost assessments and adopting holistic transport solutions.

This includes, for example, consideration of what commuters experience when leaving their place of residence and travel into a CBD, to the integration of transport modes to assure optimal journeys – and the impact that dynamic population growth will have on **infrastructure development** to keep up.

It's time for cities to be proactive

The time for stopgap, Band-Aid measures is over. In the long term, the cities that forge ahead will be those that place **urban planning** at the fore of the city agenda.

Cities need to invest in effective, efficient and safe public transport – but this requires political will. For change to be effected, partnerships need to be forged between governments, the private sector and the community. Crucially, all efforts must be underpinned by broad collaboration between the three to define the problem and then translate meaningful policies into long-term transport solutions that will transform the lives of the populace.

These integrated transport solutions will include optimal blends of pedestrian zones, privately-owned vehicles, shared transport services, **mass public transit systems** and mobility services like Uber and Lyft. We can't science our way out of this one by summoning an AV.

And, of course, the regulatory environment must be conducive for the whole transport ecosystem to operate seamlessly.

The mobility evolution is here. Tom Cruise and his Minority Report vision of transport is still many decades away. It's the cities that respond to the need, adapt and remain at the forefront of the evolution that will lead their citizens into this brave new world and get them moving around the city in a multimodal mix of technological solutions that combine autonomous and manual, public and private, shared and individual, as well as mass versus dedicated.

Navigating the blend of these modalities is where the real intellect will come into play. We won't simply be able to join the creed: "All hail the AV!" because, once we get to that space, the arguments for the next leap to "Beam me up, Scotty" will be on the table for our innovators.

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IS THE BUREAUCRACY OF DEMOCRACY BOGGING DOWN OUR FUTURE?

Nick Gordge

Speaking of his approach to building, the much-venerated 19th-century British engineer Isambard Kingdom Brunel said, "I am opposed to the laying down of rules or conditions to be observed in the construction of bridges lest the progress of improvement tomorrow might be embarrassed or shackled by recording or registering as law the prejudices or errors of today."

He didn't mince his words. As one British barrister puts it, if Brunel were alive today the construction industry wouldn't touch him with a bargepole.

But could there be some merit in Brunel's radical view on the subject? What if we took some of the red tape out of the construction equation and created a less cumbersome bureaucratic process that doesn't bog down development?

Shifting the focus

Using a modular method, Chinese prefab construction firm Broad Sustainable Building, two years ago built the rectangular, glass and steel Mini Sky City in a mindboggling 19 working days.

At the back-end of that process of course was the four-and-a-half months the company spent fabricating the building's 2 736 modules before it could begin construction.

We often see design and construction phases being accelerated, and construction is often fast-tracked, so even if we employed more efficient building processes and used a just-in-time construction approach, we would still only be able to reduce a small part of the overall project life cycle. The largest part of the project cycle is pre-implementation; from conceptualising the problem and developing the business case during the initiation phase, to wrapping up the planning phase, which includes community engagement, getting project approval and planning permission, not to mention a host of other approvals.

Quite often, the pre-implementation phase takes months and even years, meaning that we are building infrastructure years after the need arose and, by this time, the challenges it was envisaged to solve are either far worse or, even more concerning, irrelevant. We need to turn the process on its head.

Democracy in the best sense of the word

In the wake of the digital revolution of the 20th century, the world has been hurtling forward at breakneck speed. Governments and industry have been racing to meet the very real challenges presented by the rapidly increasing demand for infrastructure development. But the industry's hands are tied to a large extent by the lengthy review processes stymieing progress.

In the US, for instance, a trillion-dollar infrastructure plan will necessitate a reworking of a protracted federal review process. Projects invariably get delayed during the **environmental review** process; building a new highway can take anywhere from nine to 19 years.

It's a catch-22: democracy has given people a voice – people who pay taxes and in turn expect service delivery, but understandably want a say in the shape and form those services take. Unfortunately, as demonstrated in the case of the US, the process is fatally flawed. As a consequence, service delivery is severely impacted – and the end result is an unhappy citizenry and lost economic benefit.

Turning the process on its head

Checks and balances are critical, but it's counterintuitive to have these carried out at the end of a costly design process.

In a **2014 report**, the **Australian Academy of Technological Sciences and Engineering** notes the importance of "earlier richer community engagement and deliberation on processes for infrastructure development and delivery", which would "result in greater community acceptance of, and hence faster, and more successful completions of infrastructure projects".

The Asian Development Bank's (ADB) **Meeting Asia's Infrastructure Needs report** projects the infrastructure needs for 32 of the ADB's 45 developing member countries. In its report, it emphasises the importance of a well-functioning, multi-stakeholder institutional "ecosystem" for infrastructure development.

> "CLOSE COORDINATION ACROSS GOVERNMENT LEVELS - NATIONAL, PROVINCIAL, AND LOCAL - IS ESSENTIAL FOR INFRASTRUCTURE DEVELOPMENT," READS THE REPORT.

If the regulatory mechanisms and public engagement were initiated at the outset of a process, it would influence the design from the very beginning. An oversimplified version of the approval process would look something like this: both government and the public are canvassed for comment; that data is then fed into a parametric design process which produces several optimal design scenarios based on the feedback; the best fit makes the cut and the end result is a plan that has in effect already been approved.

The future should loom larger

The painting that hangs in a corner of Room 34 of London's National Gallery is a picture of dull light and dark contrasts. Set against a backdrop of gloomy, overcast skies, a train – a blur – steams across Maidenhead Railway Bridge over the River Thames.

The bridge depicted in English romanticist painter William Turner's Rain, Steam, and Speed forms part of Brunel's most ambitious project; a network of **tunnels**, bridges and viaducts for the Great Western Railway. The **railway** transformed travel, pitching Britain into the industrial age and reducing the two-and-a-half day journey from London to Bristol to two-and-a-half hours!

Turner's painting was a statement on the ascendancy of man-made industrial society – but can we afford a debate over the rapid advances being made today?

Urban populations are expanding at full tilt – and with them a steep escalation in the demand for infrastructure and technology. The ADB's report estimates the infrastructure needs for 32 of its developing member countries will require an investment of a whopping $26-trillion over the period from 2016 to 2030, including the cost of climate mitigation and adaptation.

Well over a century-and-a-half after Turner's painting was first exhibited, the question we have to ask is: what are we going to do to ensure that tomorrow's infrastructure meets tomorrow's needs instead of merely addressing yesterday's problems?

It's a discussion engineers need to lead if we hope to see the world prepared for a future advancing towards it at a dizzying pace.

Safeguards are important – but so is the opinion of the experts. But this hinges on trust. In the same way that we entrust our well-being to medical experts, we need to trust professionals in the **built environment** to do a brilliant job of designing and constructing **sustainable, economically viable, future-ready** cities. This means rethinking the way we do things.

Massive financial outlays are required to develop infrastructure in both developed and developing countries worldwide – the ADB case is merely one such example. Do we really want to play it so safe that those financial outlays only just meet our current needs?

Or do we need a touch of Brunel-like chutzpah mixed with a whole lot of innovation? It's those cities willing to take the risk that will be at the forefront of the next revolution.

BEING CREATIVE – WHY GOOD IDEAS AREN'T GOOD ENOUGH

Jody Boshoff

Winged cupcake emojis and Donald Trump tweets are not the only 'creative' contributions to social media these days. Platforms such as Facebook and Instagram have acted as global chalkboards on which the English language has been tweaked, tinkered with and at times overhauled.

A friend is now a verb, and numbers serve as 1daful substitutes for words, altogether. But just before you think the corporate environment is above the #trending hype, think again. We also use our share of buzzwords like one-up wonders around the boardroom table. Let's take this one for example: creative. "He's a creative," we've heard it said. The mere sound of it puts a confident swagger in your step. Who doesn't want to be known as that?

But here is a thought. Creative is not always innovative!

Creativity isn't necessarily innovative, there's actually a difference between the two. While invention requires creativity to come up with new things, innovation is about applying those new things in different ways. Creativity is essentially an 'inward' trait. It's murkier and harder to define. Ideas within the creative realm are often judged more by their novelty than by their potential usefulness, either to consumers or to the company.

Innovation, however, is 'external', attached to a sense of value, utility, or productivity that has been measured and tried. "Often, in common parlance, the words creativity and innovation are used interchangeably," states Robert B. Tucker, author and consultant. "They shouldn't be, because while creativity implies coming up with ideas, 'it's the bringing ideas to life'... that makes innovation the distinct undertaking it is."

Creativity must aim for innovation

It's not enough to daydream inspiring and original ideas in our field; it's imperative to action them.

Take the VELCRO® brand hook and loop fastener, for example. The concept for this prolific fastener was born under the microscope, when a Swiss electrical engineer observed a single burdock burr that had clung to pants and dog's fur in a walk through the woods. The engineers saw how the little seed acted like a hook that attached to loops in material and hair. But because they saw value in the concept and went on to repeat it synthetically, they invented one of the most useful products in the past century. They didn't just think up a good idea; through trial and error, adaptation and experimentation, they perforated imagination and brought the idea to life.

Image courtesy of **veronikabowyer.com**

Innovation is not overnight

Even a proverbial scrum of the greatest minds can have a bad game sometimes. **Aerospace Engineer Adam Steltzner** refers to it as the **Dark Room**. "There comes a moment in every creative or innovative process," he says, "when you're not only lost, you're not even sure where to find a map… you have to stay calm, hold on to the doubt, listen to the problem, and keep thinking of solutions, while avoiding the mind-locking panic that you won't find a solution. "We're often uncomfortable with staying in the problem long enough to innovate".

In another case, the solution was a rather serious one. **A debut of the Mars Exploration Rover mission** was scheduled for departure in June 2002 and Houston had a problem. The team of rocket scientists could not figure out how to make this Rover land intact, impervious to the piercing rocks and debris on Mars' surface. One strenuous year later, they found their answer. **"There is virtue in staying in the Dark Room until you completely surrender – not give up but completely surrender your ego, and stop trying to force the existing solution. That's when a breakthrough occurs."**

Creativity is the launching pad. But it requires innovation and sometimes teeth-gritted determination, sheer panic and a whole lot of guts to launch the mission.

WHY DOES THE FUTURE TAKE SO LONG TO ARRIVE?

Sam Dungey

Image courtesy of **veronikabowyer.com**

In late 1971, a computer engineer named Ray Tomlinson sent the first email message. It was ten letters long (QWERTYUIOP) and he was probably oblivious to the fact that hitting 'send' would gain him entry into the history books. Tomlinson's invention changed the course of communication forever – usurping technology such as the fax. 205 billion emails are **sent every day**, and this will reach over 246 billion by the end of 2019. Yet, the email hasn't yet usurped the 'paper trail' and truly paperless systems are few and far between.

Paper stubbornly remains a feature of our everyday lives. Decades later, the paperless office is being called a **'30-year old pipe dream'** and the United States Postal Service still processes and delivers **509 million pieces of mail each day**. There is no doubt that the reliance on paper is decreasing, but we are still years away from actually achieving the paperless nirvana we were promised.

If paper is stubbornly sticking around, what does this mean for other technologies that are supposed to eradicate the problems of the past and deliver to us utopian efficiency and productivity? Is it a harbinger for all things 'paperless', such as paperless money? **Bitcoin** (the world's first digital currency) claims that it will change finance in the same way the web changed publishing – yet, we have had credit cards for decades, and many still carry cash.

Why can't we let go? What will it take to 'kill' analogue systems off once and for all?

Technology is not 'yet' ready

The tools for going paperless are both accessible and economical; you can easily scan a key document and save it in PDF format; e-books can be downloaded and read through myriad digital devices; and receiving all of your bills via email is a cinch. But while this technology has come a long way, it still has an uphill journey to be truly 'ready'.

Paper does not need reboots, passwords, or charging. Paper notebooks do not 'crash'. Bic pens are ready to write, whether you have 4G connectivity or not. With paper, there is no system to learn and shortcut keys to memorise. Alexa needs to be plugged in, while Siri, Cortana and Google Now can't doodle.

The transition of paper to electronic document has not solved the issue of content chaos. We are still trying to remember which folder we saved that contract in. When the system fails, which is unpredicted, we easily fall back on paper and legacy paper processes. In addition, the reality for some organisations is that there are multiple touchpoints in the workflow that remain analogue.

Coupled to this, many have said that the practicality of paper is hard to beat on project sites; it is disposable, easily replaced and you can edit (using a red pen) as you please. Decades have passed, and the use of paper still feels natural and inherent. In the words of **Getting Things Done** author David Allen, "...the easiest and most ubiquitous way to get stuff out of your head is pen and paper."

Users are (often) not the centre of things

Amazon Kindle is an e-reader device that enables users to read e-books, newspapers, magazines and other digital media. Tech developers saw the need to mimic a book in tablet format, but still provide the feeling of reading a book (turning a page, etc). Why was Kindle successful? Because developers placed the users at the heart of the technology experience. We often forget that systems and apps meant for everyone must be designed for everyone.

E-signatures and encryption are only useful if the people you want to communicate with have the same tools. The **Moleskin Paper Tablet and Pen+ combo**, which digitises your handwritten notes and doodles for editing and sharing, is reliant on its smartpen and mobile app to make it work usefully. Microsoft's **Courier Tablet**, a book-sized digital journal with a native stylus, held promise as a tool designed for the creative minds, in which architects can sketch building plans or writers can draft documents, but it didn't catch on – content creation alone wasn't enough.

Many systems and apps fail to benefit those who use them. And for that reason, creative professionals who write, sketch, or prototype by hand still carry cheap notebooks and pens. Until technology can perform like (or better than) paper, we'll incessantly default to the original.

People will probably be stuffing wads of cash under their mattress for the next 50 years, possibly more. Vinyl records will continue to be played occasionally, and we'll still see horses and carts on the roads (the queen drives in one every now and then).

In reality, we'll more likely experience a blended future in which new and old systems co-exist. And this will apply to a plethora of new technologies, not just paper, including those such as autonomous vehicles. Collectors may always want to own a 'self-drive' vehicle and if that is the case, then we'll need systems and infrastructure that allow both systems to coexist.

Going forward, the 'fast track' to the future may literally be one in which the Hyperloop jostles for space among 'vintage' Volkswagens, BMWs and Volvos. Look left, and a drone will be delivering a pizza. Look right and you'll notice someone doing the morning 'paper-run'.

And whilst we all may fantasise about efficient sci-fi future worlds filled with Minority Report holographics, it is likely to be the transition from our current realities to these future enabled utopias where the real engineering challenge will lie.

Such are the "Back to the Nature" characteristics of 'progress'.

CAN THE ART OF WAR TEACH US HOW TO PIONEER AN INNOVATION INDUSTRY?

David Barnes

It is an inconvenient truth that from the dawn of mankind, war has been a sad feature of the human condition. Human conflict comes at enormous cost with its impacts on people and society.

Paradoxically, the need to defend yourself has also meant that defence has also been a key driver of many economies and the need for a winning edge on the battlefield has made the military a source of great innovation. An uncertain geopolitical environment and complex future means that the need for national defence will remain. And militaries globally perform valuable roles in aid relief, humanitarian aid, disaster recovery and peacekeeping.

The question is not what the military is or for, but could defence become an incubator for emerging disruptive technologies? Nobody wants their business to be disrupted but the military works in the ultimate disrupted marketplace. Could new partnerships and linkages between the business world and national defence forces allow pre-emptive strikes to be made to leverage and maximise the benefits of disruptive technology?

Defence has always been a testing ground for new technologies to be prototyped and trialled, but could the sector also work with businesses to do the same with **emerging disruptive technologies** before being launched into the mainstream consumer world?

In the 2014 movie, The Imitation Game, set in World War II, a group of British code-breakers race against time to crack the Enigma codes, a machine used by the Nazis to send encrypted messages. While the jury is still out on the movie's accuracy, the fact is that it is a wonderful example of innovation and disruptive technology being used to give an advantage strategically. The British are credited with developing the first electronic computer as a means of breaking the code. It was a pivotal moment in history, one that contributed in no small way to the outcome of World War II.

During the Gulf War, coalition forces took emerging advances in electronics to improve targeting systems to produce the precision weapons that proved so devastating against Iraqi forces, completely disrupting traditional ways conflicts had previously been fought. For generations, conflicts have not only provided the mise en scène for displays of the application of disruptive technologies, but have been the driving force behind their development in the bid to reinforce military capabilities.

Business has long drawn lessons on leadership and business tactics from the battlefield. Take Chinese military general Sun Tzu's Art of War for example written more than two thousand years ago, the book remains the Holy Grail of leadership inspiration for industry leaders. Its tenets on thinking about the problem are early examples of **design thinking**.

But what about the **invaluable lessons on innovation** that could be gleaned from war?

Defence has always forged strong partnerships with industry to identify and be an early adopter of new technology. But what if new types of partnerships were to be forged between industry, government and the defence industry, who's to say a new frontier in innovation wouldn't be breached?

Wars are synonymous with technology

If World War I was characterised by rapid advancement in technology, World War II was the war most defined by it. So much so that its impact would echo decades into the future.

At the core of these advancements was a mathematical, scientific and technological wizardry. New inventions and the advancement of scientific principles form the basis for inventions we couldn't do without today.

Rocketry that was pioneered in WW II would later lead to the building of the rockets that propelled the Apollo spacecraft to the moon.

Then there's the radar system. The radar system uses radio waves to determine the range, angle or velocity of objects. It's now widely used air traffic control and weather forecasting are just two examples of its application. Not forgetting the household item most of us couldn't live without: the microwave. The appliance was developed post-war after it was discovered that microwaves transmitted from radar equipment during WWII could also cook food.

The military has always been at the forefront of technology. The Global Positioning System (GPS) is yet another example of this. Bringing an end to the age-old point of contention in many relationships by helping men save face without having to stop to ask for directions, the GPS has become an integral part of life as we know it. Yet its origins hark back to the 1970s, when the US Defence Department set up a network of satellites.

Research and development are non-negotiables

Defence is a major part of many national government's spend and effective national defence is a priority in this complex world. Is there a new way of extracting wider national value out of this investment, and how can nations use investment in national defence as an incubator for a strong defence sector that acts as a stimulator for economic growth and an ideas incubator? And does size matter – is innovation in defence only the prerogative of the superpower?

A country that has dominated the technology sphere is Israel. Underpinned by a long tradition of close relations between the various arms of the Israeli Defence Force (IDF) and the state, the nation has spearheaded numerous advances in weaponry, including deploying the first armed unmanned boat for surveillance and protection.

The country's research and development industry has also been driven by the state, engendering a culture of impressive innovation. In fact, the IDF has served as an incubator for a number of founders of high tech companies. Outside of Silicon Valley, Tel Aviv has more start-ups per capita than any economic hub in the world – one of which birthed the USB flash drive.

Israel presents a strong argument for a marrying of state resources dedicated to defence research and development and innovation incubators. Could this be the recipe for a wildly successful innovation industry?

Championing innovation

Technology has – and is – disrupting every industry, from entertainment to infrastructure development.

This is compounded by the fact that with the growth of technology and associated costs, licensing, **collaboration**, joint ventures, mergers and cross-ownership suddenly begin to look far more attractive. Concurrently, the lines between technology and purely military applications versus wider application is blurring. This has seen the boundaries and responsibilities between the military and it's supporting defence industry and partners increasingly blur. If the military has become dependent on industry, how can industry leverage that to gain a competitive edge in other sectors?

In the midst of this, **governments** are grappling with very real challenges, racing against the clock to meet their development goals and **future-proof their cities**. It's the perfect storm: a convergence between government, the defence industry and industry partners is as inevitable as it is necessary.

This presents an opportunity for the three to leverage each other to find solutions in **transport**, **energy**, **health**, education and other spheres.

It's the logical next step for industry to spark a revolution of a different kind. Instead of responding to technological disruptions, industries need to be at the vanguard of innovative technologies.

The innovation war will be won by those who dare to press on to the next frontier and beyond. The resultant technological gains could set industry up for immeasurable success.

IS INNOVATION CHILD'S PLAY?

John Hilton

Could seeing our problem through the eyes of a child allow us to achieve better innovation? The 'Spaghetti Tower Marshmallow Challenge' is a popular exercise in which teams are given eighteen minutes to design and build the tallest free-standing structure possible out of 20 sticks of spaghetti, one metre of tape, one metre of string, and one marshmallow, which has to be on top.

Similarly, during Aurecon's annual bridge building competitions held countrywide for school-aged students across Australia and New Zealand, teams design and build their own bridges from balsa wood, glue, string and cardboard. The bridges are load tested to find out which school's bridge can withstand the heaviest load before collapse.

Astonishingly, when it comes to the first challenge, preschoolers, children, and students repeatedly outperform business school graduates and engineers; while the bridge that has supported the greatest mass of all the bridges designed and constructed by both bridge engineers and students across Australia and New Zealand in the last 12 years was designed and constructed by three 14 year-old school students.

Why do the seemingly 'inexperienced' and 'untechnical' (unqualified even) consistently outperform their 'experienced', 'technical' counterparts?

Lesson 1: Learn along the way!
Business students, engineers and adults are trained to find a single successful plan, quickly, and then execute that plan. They collaborate, they plan, they carefully build the structure, and then put the marshmallow on top last.

Unfortunately, these are usually very slender structures, and often the extra mass of the marshmallow is sufficient to cause the structure to buckle and collapse. Now they have run short of time and the situation quickly turns into a crisis, when decisions have to be made quickly. Preschoolers, on the other hand, usually start with the marshmallow, and then build prototype after prototype, always keeping the marshmallow on top and allowing themselves time to improve continually. This learning-driven approach doesn't wait for a crisis – it incorporates ongoing improvement into its approach from the onset.

Lesson 2: Beware of hidden assumptions
Both of these challenges help participants identify hidden assumptions such as "marshmallows are light and spaghetti sticks would easily support them"; or "balsa wood pieces are straight, so the bridge must comprise straight lines".

In reality, marshmallows aren't so light when you try to build a structure from spaghetti and balsa wood, cut into smaller pieces and bonded, can form a curved arch. It's essential that we identify hidden assumptions in our projects on a continual basis. This means questioning what the real needs of end-users are in relation to cost, time, flexibility of function, uniqueness, quality, and durability, and accepting the challenges involved in implementation and reviewing these assumptions on an ongoing basis.

Lesson 3: Don't be afraid to fail!
Another reason children often outperform adults could also be because they don't have an innate fear of failure, and are open to ideas and suggestions from others. When the students' bridges are about to be tested in front of several hundred people and their peers, they invariably exude excitement and enthusiasm and view the experience as an opportunity for learning.

Lesson 4: Don't look backwards – look forward!
In real life, the first thing bridge engineers often do in designing a new bridge is to look back at a recent one they designed and modify that design. Many of the students aim for the direct opposite. In constructing their bridges, the students sometimes impart a

deliberate and apparently random flair such as a flash of red paint applied to on one of the members, or one truss member moved slightly off centre.

The results from these small tweaks have earned many students extra points in the aesthetics department and proven that design, or solutions, shouldn't only be based on the past. Where infrastructure is concerned, a distinctive solution can often be created through an almost insignificant increase in cost.

Lesson 5: Teamwork is key…
It may sound obvious, but children are less likely to jostle for position or rank than more senior participants; they focus on the task at hand and consider the perspective and feedback from their peers with unequivocal acceptance. This makes room for diverse perspectives in arriving at a solution that has conquered a multitude of assumptions.

Most of all, it's important to pause for a moment and ponder how these lessons might apply not only to the smaller problems we face in the business world but to some of the biggest problems facing the modern human – such as a lack of universal access to clean water, growing congestion in cities and ongoing power shortages.

There is a very clear call to action to be gained from these two microcosms: that of starting to see our problem through the eyes of a child. This will allow us to begin to see some of the solutions and opportunities we don't see as adults. The infrastructure we build today will be inherited by the children of today and, as such, what might they say if we asked them: "Where should we place a greater emphasis?" Those answers would probably be markedly different to the ones we would get from adults.

If more of us asked this – just imagine the results.

IS DESIGN THINKING A FAIRY TALE?

Maureen Thurston

Systems thinking. Integrative thinking. Design Thinking. Left brained. Right brained. Whole brained. The character of our thinking seems to be the new competitive currency. A quick Amazon.com search of books with 'thinking' in the title revealed 44 797 results, while 'how to think' tracked 451,009! Intellectual discourse is flourishing between neuroscientists, cognitive psychologists, artists, philosophers, and business gurus alike sharing what they think, about thinking. But why has the subject captured our imagination? Why now? What's going on?

...as Dorothy said to Toto in The Wizard of Oz, "We're not in Kansas anymore."

The character of our thinking seems to be the new competitive currency. The well-oiled tools, theories and practices that proved their worthiness over the last 100 years, no longer suffice. Competitors are feistier. Customers are ever more capricious. Commoditisation is commonplace. Complex global interdependencies threaten economic stability. The ideals of 'reliability and predictability' that mitigate risk have been swept up in a tornado of uncertainty.

Discussions on Design Thinking have gained considerable traction in the C-suite, especially when a company like Apple resurrects itself to become "the worlds' most valued" enterprise. Countless studies, books and blogs have popped up trying to decipher Steve Jobs' secret. Can its success be duplicated? Or is Apple an anomaly? An inherently clever organisation led by an iconoclastic leader – the archangel of 'think different' fame.

Being relevant in 2020 and beyond will require a different set of skills from the ones that drove business success in the past. How does an organisation devise their-own Apple success story? How does an organisation leverage design as a strategy and imbue a culture with creativity? How could thinking like a designer make a difference?

Thinking like a designer

Design Thinkers have a certain disposition. A mindset that doesn't get flustered by ambiguity – it's inspired by it! They're obsessed with imagining what might be possible – driven to challenge the status quo. Design Thinkers take a holistic approach to understanding the problem from multiple angles and stakeholder perspectives. It's a belief system that if you explore the shadows, you'll uncover the underserved need, the unique opportunity. (Steve Jobs was a Design Thinker.)

Combining the capabilities to 'think like a designer' with the methodologies to 'work like a designer', and any organisation will be able to adapt to turbulent times, not be paralysed by it.

Creating a better future through design thinking

Everyone has the capacity to become a Design Thinker. As with Dorothy and her ruby slippers – we all have the power, we just need to know how to use it. However, there are two important hurdles that must first be overcome:

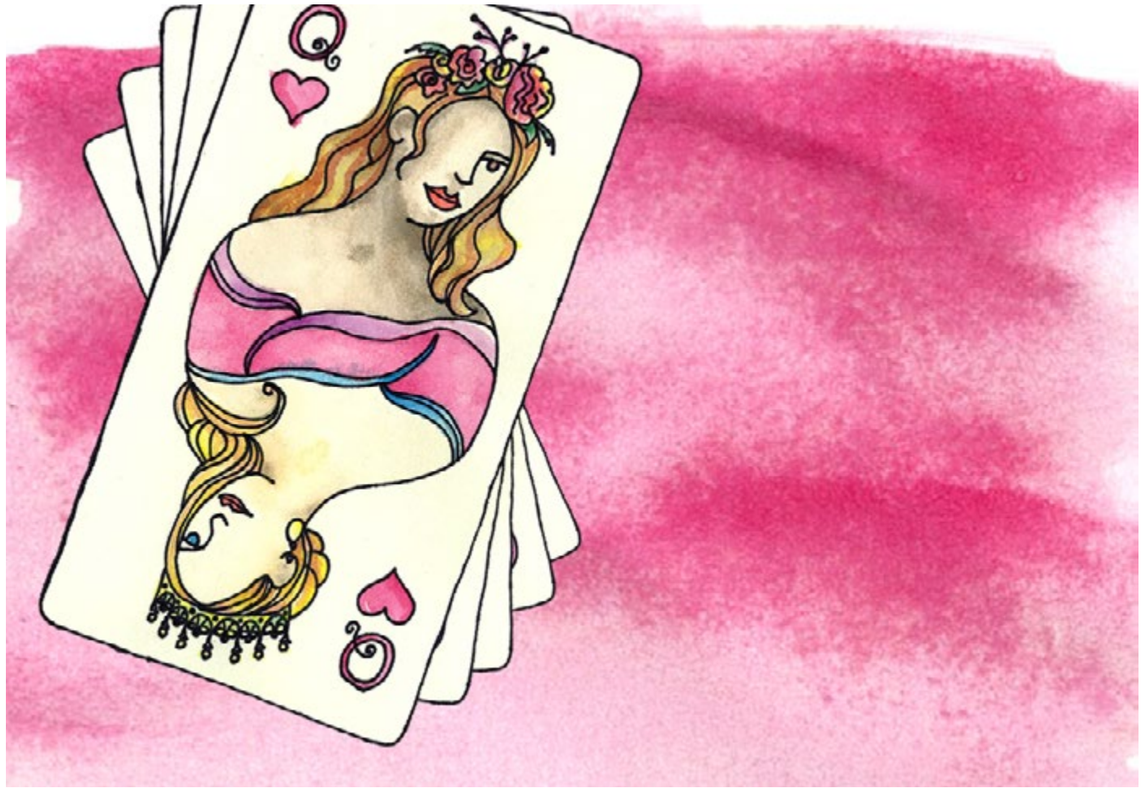
The first is clinging to rigid habits and default behaviours. If we're to explore the new, we must let go of referencing past successes to make way for bolder, braver future solutions.

The second hurdle is a perception of 'time'. Is it considered a cost? Or an investment? Taking the time to 'stop and think' is critical. It is not a luxury; it's a necessity and a core tenet of Design Thinking. And therein lies the rub. In a business ethos where speed to solution is revered and utilisation rewarded, in general, managers believe design takes too long and in particular – designers are bewildering.

Seeing into the future isn't easy. Even the Wizard of Oz couldn't do it. But look behind the curtain and you'll discover that design enables us to create new value with our clients. It is not a fairy tale. As we learn to shape our future and the means by which to profit from it as design thinkers, we'll be taking the first steps down the yellow brick road.

WEIGHING UP A PROBLEM? LEARN THE ART OF BALANCE

John McGuire & Jody Boshoff



During the early 1900s, two shoe salesmen travelled to Africa in search of new market opportunities. In their telegrams back to Manchester, the one man wrote, "Situation hopeless. Stop. They don't wear shoes." The other reported, "Glorious opportunity. They don't have any shoes yet." Same situation, polarised responses. Where one man concluded that opportunity had not come knocking, the other chose to build a door.

Urbanisation is currently emerging as the predominant narrative of our century. By 2050, it is estimated that over two-thirds of the global population will have **relocated to cities** in search of better **infrastructure**, services and jobs. This diverse influx is forging fresh paths of opportunity and **collaborative creativity**.

Yet, this migrative highway is also forming deep divots: congestion, pollution, **deteriorating wellness** due to sedentary behaviour, aggravated demands on power and **water networks**, a need for more housing, higher deposits of fossil fuels increasing carbon displacement to the atmosphere. Ironically, by flocking toward prosperity, we are also destroying it.

Both realities are legitimate and undeniable. The question that remains for tomorrow's innovators is, how do you see the world? The challenges posed by urbanisation can either sink us or project our human and technological capacities into a new problem-solving stratosphere.

We are facing either a dead end or a whole new beginning, depending on how you look at it.

Cultivating an eye for opportunity

The concept of finding balance is ingrained in our psyche throughout our entire education. Every equation we do in school and university has an equal sign – the left-hand side must balance with the right-hand side. All of the laws of engineering that we learn in university are based on this same fact with the goal of finding balance. Actions trigger equal and opposite reactions; **energy** cannot be created or destroyed, but rather transformed; closed system entropy always seeks an equilibrium. All of these laws are about achieving balance.

On a macro level, the same forces are at work today. Since the Industrial Revolution, the scales of 21st century society have been tipped towards imbalance that manifests itself in **climate change**, **congested cities**, urban slums and **mountains of waste**. But, we now stand a chance to restore that equilibrium and remedy society's formidable ills.

British banker and financier Nathan Rothschild understood that the more unpredictable the environment, the greater the opportunity. "Great fortunes are made when cannonballs fall in the harbour," he noted, "not when violins play in the ballroom." So the growing global crisis of urban congestion can be mitigated by **autonomous cars**. Fossil fuel pollution can be reduced – even eliminated – by the introduction of electric vehicles. **Smart grids** can optimise energy usage and eliminate waste. Each problem can be a blessing in disguise, offering ripple-effect solutions that benefit the human story environmentally, socially and economically.

Problems pave new markets

As an alternative to cattle farming, one of Singularity University's brainchild companies, Modern Meadow, has created 'leather' through fermentation of yeast and biofabrication. Having taken animals out of the equation, the demands on land and water are almost entirely eliminated, along with a 96% reduction of greenhouse gas emissions.

BlueOak Resources has also found a lucrative gap. They capture an estimated $70 billion-worth of precious and base metals, locked up in the 40 million tons of e-waste that is landfilled or incinerated annually around the world.

Matternet surmounts the challenges posed by poor road infrastructure to people in developing nations. They have built a network of drones (UAVs) that carry up to 2 kg packages of critical goods like vaccines, medicine, or needed replacement parts. At a fraction of the time and cost, and with high profit and value margins, goods can be moved effortlessly to isolated communities.

Sink or swim

On the backdrop of an urbanising digital reality, the US National Assembly of Engineers asked the question, what are the grand challenges that tomorrow's engineers will have to solve to improve quality of life? Forty countries responded. A broad spectrum of recommendations was made, ranging from making solar energy economical to providing access to clean water.

In order to see these problems as fantastic stepping stones, engineers will have to recognise, realise and embrace their skill set and understanding of balance. Realising their power to use their skill set and learnings to find the balance between social, environmental and economic drivers is only the first step. Taking meaningful action will also involve challenging the lie that engineers are too far down the value chain or subservient to other more important players. Only when they do this can they eyeball and take on the challenges of today for the betterment of the communities they serve.

Winston Churchill said, "A pessimist sees the difficulty in every opportunity; an optimist sees the opportunity in every difficulty." Today's realities beg a choice: either fall beneath the crushing weight of crippling conditions, or rise to meet our finest innovative hour. It's up to you. But choose.

THE DRAWING POWER OF IMPERFECTION

Darren Tan

Nothing says 'forever' quite like a diamond does. Cubic zirconia, on the other hand, may ring of 'prenuptial' in your partner's ears. Why is that? Because, quite simply, man-made cannot rival the 'real thing'. Anyone knows that a real diamond means forever.

Today's quick, quicker world of processes to fast-track production is hot on the trail to perfection. With highly sophisticated technology driving future supply chains, we can expect Just In Time (JIT) product delivery with minimal cost and zero human error production. Manufacturing processes with fewer overheads, more control, and ultimately greater gains in market share. For the average inventory manager roaming the dim warehouse aisles, the future could not look brighter.

But for the partner with the retracting ring finger, cubic zirconia is unfortunately not bright enough. Those flawless and **artificial** facets will never inspire like the stories behind those diamond chipped edges do; with each chip representing an origin story and a snapshot in time. In a world searching for perfect production, companies should consider the drawing power of imperfection to the average customer.

We must tap into the emotions of our clients and preserve the narrative of the product if we want to drive true innovation and ignite consumerism. Technology is replicable, but the human fingerprint is not. The owners of the hugely popular **ice hotel in Sweden**, which every year is built from scratch in a unique design, will attest to this fact.

Innovating with intangibles

With all the focus on digital disruption, it is easy to forget that **technology is not the panacea for all ills**. Artful organisations with a one-up advantage include intangibles in their innovative agenda. Leaders in global innovation, Doblin, argue that simply creating new products is bare minimum thinking at best offering the lowest return on investment and the least competitive advantage. They rather go beyond the traditional product model to include "Ten Types of Innovation", which build breakthrough profit models and dynamic work cultures. How did the customer engage with the product? What does the customer cherish in the pre- and post-production process? Where can new revenue and pricing opportunities open up throughout the stages of product configuration? A more robust and honest business approach will place people in the centre of big picture thinking.

Simon Sinek packages the imperative of purpose in the marketplace with a single word: why? "Your 'why' is the purpose, cause, or belief that inspires you to do what you do," he states. While markets streamline and sophisticate, people are evermore drawn to understanding the uniquely human contribution they can leave behind. They seek environments in which they are more inspired and likely to be fulfilled by the work they do.

When people are genuinely happy to go to the office, they are more creative and transformative in their industry. This entrenched sense of meaning and purpose within a corporate culture is, in turn, only good for business. After all, it's not only what we sell anymore; it's who we are that determines today's price tags.

The allure of authenticity

Authenticity never goes out of style and Birmingham City University School of English's most recent consumer study proves it. Among the most lucrative words used by sellers on eBay in 2016, authenticity was the most prolific. In a technologically infused world of mass production, people are becoming allergic to consumer experiences that would leave them feeling as if they too have been put on the assembly line. Especially when 3D printing is rewriting the rules of supply and demand and putting the power of production in the hands of the consumer, people are seeking products that are original, even idiosyncratic, with their own peculiar story to tell.

Having fallen on hard times from the influx of Chinese cheap goods into global markets, the industrial heartland of northeastern Italy has managed to rise above the rubble with traditional artisanry reimagined. Craftsmen are applying rapid prototyping and other digital technologies to offer online buyers custom-made, local designs and innovations.

Where Italian demand wanes, third-generation cobblers, for example, can use the connecting power of the Internet and expand their shoe shop beyond physical market borders through 3D laser foot scanners. Foot measurements are able to be taken from anywhere with this technology, opening up the possibility for indigenous companies to run with the big boy multinationals.

With a 3.5% increase in exports that continues to rise, this web of small industries is illustrating the fact that a digital economy can ballast time-honoured artistry and reinvent fresh pockets of consumerism. The connecting power of the internet has opened the possibility of these craftsmen winning not only the minds but also the hearts of their consumers through sharing their origin story and beliefs. As one provincial designer reminds us: "Even when you do something with new technology, you can't forget the aesthetics of the past."

Aligning to emotionalism

According to the Harvard Business Review (HBR), the role of emotions in determining consumer behaviour cannot be underestimated. Given their ability to sway spending, companies must pursue a strategy and science around how to develop emotional connections in the marketplace. It's not an exact science, as very often customers' own desires are deeply subconscious.

However, through big data analysis, companies are able to identify and tap into the emotional motivators that drive profitable behaviour. When brands project visceral connections such as 'feeling a sense of belonging', 'feeling secure', and 'having confidence in the future', customers are more apt to align their spending accordingly.

So, when Nescafe aligns the image of a steaming mug to a man who overcomes his disability with humour and courage, we are moved. A cup of coffee has become a symbol of faithfulness and reliability a friend who remained in the palm of the struggling protagonist until the end.

HBR would describe it as 'full emotional connection' the culmination of the 'emotional connection pathway' that customers undergo throughout the brand positioning and marketing process. Interestingly, the difference in value ratio between a customer who just loves the coffee and a customer who feels emotionally connected to the brand is 52%.

Philip Pullman once said, "After nourishment, shelter and companionship, stories are the thing we need most in the world." Fundamentally, economics is a mirror to what people prize, as our consumer behaviour says more about who we are than what we do. On the dawn of digital disruption, organisations will do well to consider the unquantifiable the deep-seated desires to write our own story onto the page. The companies who win the future will be those who hand people the proverbial 'pen and paper' and understand: some things you just can't 3D print.

THE PROBLEM WITH GOOD IDEAS

Peter Greaves

Ideas. We've all had a fair few of them. Some were bad, many average, but your very best ideas, using our trusted bell curve to define them, were definitely the good ones. You might have even been told, perhaps on more than one occasion, that your 'good ideas' are better than other people's 'good ideas'. If this were the case, there would be plenty of evidence of our 'good ideas' being turned into finite creations for the rest of the world to admire. But how often does this actually happen? It's hard to break this to you, but perhaps your 'good ideas' aren't very good at all...

Have you ever watched young children play sport? Everyone on the team gets a trophy at the end of the season, even though, it's patently obvious to anyone who watches them play that some players are far better than others. It's easy to see why we would want to keep on encouraging the weaker players to keep on playing sport at this youth level, but once we move up a few leagues into the professional ranks of work it becomes less obvious to see why we would want to reward people for anything less than their best ideas.

In the same way, the modern corporate world of late has, perhaps unintentionally, created a bad 'good ideas' factory, where ideas take seconds to think of, can be authored by anyone and don't even need to be any good. As long as everyone in the brainstorming room has an idea on the wall, the job's done and we can all breathe a collective sigh of relief and go home.

There's no such thing as a bad idea... or is there?

We do live in a time that demands great thinking but it seems we've created an oversupply of 'good ideas'. This has happened through recent, rapid, radical workplace change that includes an increase in mutual respect for people of all ages, genders and roles, mass digitisation and a **fear of making the wrong decision**. Unfortunately, a by-product of this might be that nobody actually knows what a 'good idea' looks like anymore.

As a **Harvard Business Review** article says, "It's not an idea problem; it's a recognition problem." In a time when the demand and pressure for innovation is as high as ever, businesses and organisations are afraid to live in uncertainty and have rejected any idea that doesn't guarantee a success. They have traded creativity for something safe; something they believe is a sure winner. But here's a newsflash: there is no such thing as a sure winner.

Sports organisations, teams, athletes, and coaches especially, know this to be true. Even when teams have talented and well-trained athletes, all great coaches know that they cannot simply just throw their players into the field and expect them to be champions. They can learn the rules and fundamentals of the game, but no rule or playbook ever gave them the 'sure way' to lead a team, let alone a guaranteed strategy to become a champion. In fact, even some of the **greatest coaches have varying and contradicting methods** in coaching from encouragement, discipline, to brutal confrontations.

"You have to tell them the truth about their performance, you have to tell it to them face-to-face, and you have to tell it to them over and over again. Sometimes, the truth will be painful and, sometimes, saying it will lead to an uncomfortable confrontation. So be it. The only way to change people is to tell them in the clearest possible terms what they're doing wrong. And if they don't want to listen, they don't belong on the team," said former American football coach Bill Parcells.

While not all may agree with Parcells' approach, this may very well be applied in boardroom pitches and discussions, a place where you cannot hand out a consolation trophy for 'good ideas'. Many companies have been blinded by the thinking that there is no such thing as a bad idea, that's why they never debate them. But, shouldn't they?

Ideas with great potential cannot fly high if no one will put it up for a fight. Elon Musk is a walking billboard of this philosophy; it is part of his marketing campaign. He puts his ideas out there and lets people argue with him about it, giving everyone with a smart gadget and internet the chance to question him and point out his flaws. But make no mistake; this doesn't make his ideas weak. In fact, it makes them even stronger. The more people debate an idea, the more it becomes clearer if it is a good one or not.

Just as Parcells suggests, you have to be brutally honest and ruthless when challenging a potentially good idea, instead of always agreeing and nodding to it, with ample benefit of the doubt, think "what if?" Raise it, debate it, and improve it; but if an idea loses and fails to make its case, know when to give up and let it go.

Why quantity is crushing quality

When it comes to generating 'good ideas', the quantity versus quality debate is never far away. Historically, 'quality' had the upper hand: we saw **Vladimir Nabokov** trying to destroy his imperfect final manuscript on his deathbed; **Harper Lee** never bettering 'To Kill a Mockingbird', and **Terrence Malick** taking a 20-year 'career break' after directing 'Badlands' and 'Days of Heaven'.

For these ingenious ideas people, they'd prefer nothing less than their perfect creations to be made public. Today, we live in the age of 'quantity', where people can post their many ideas on multiple digital platforms, hoping to gain an arbitrary number of likes, comments and shares that make them feel as though they've created something 'good'.

In 2017, we think of an idea as a **'formulated thought or opinion'** but, not so long ago, it was considered to be 'a visible representation of a conception'. Over time, we've gradually devalued ideas because of their sheer volume, availability and ubiquity. Up until the end of the 20th century, the omnipotence of the internet and wholesale digitisation were unimaginable, but then things changed rapidly and people like us were empowered by our tools, and encouraged by our peers, to put our ideas online. Even if they weren't very good.

At the start of this century, a few media friends put their heads together and came up with the very good idea of **'Idea a Day'**. The simple, but counter-intuitive, premise was that each day they'd give away their own or other people's ideas for free.

One of the founders, **Chas Bayfield**, came from an advertising background where, up until this point, 'good ideas' were valued at a premium. Chas and his chums took advantage of the fact that people were happy enough to give away their potentially lucrative ideas so long as they got to see their name printed next to the idea.

The value in their idea had been reduced to a byline on a blog they knew would never make them any money, but gave them something they craved: **their Warholian 15-minutes of fame**. Previously, these people couldn't get noticed for having 'good ideas' but, by using the democratising power of the internet they could.

Be more professional

Through digital technologies, the democratisation of information has led to the democratisation of knowledge, which in turn has led to the democratisation of 'good ideas'. Professionals with relevant degrees, pertinent experience and the titles to match are no longer the only people who can express an opinion and have 'good ideas' in the subject being discussed around the table. As **Larry Sanger**, co-founder of Wikipedia, says about the democratisation of knowledge: "Professionals are no longer needed for the bare purpose of the mass distribution of information and the shaping of opinion."

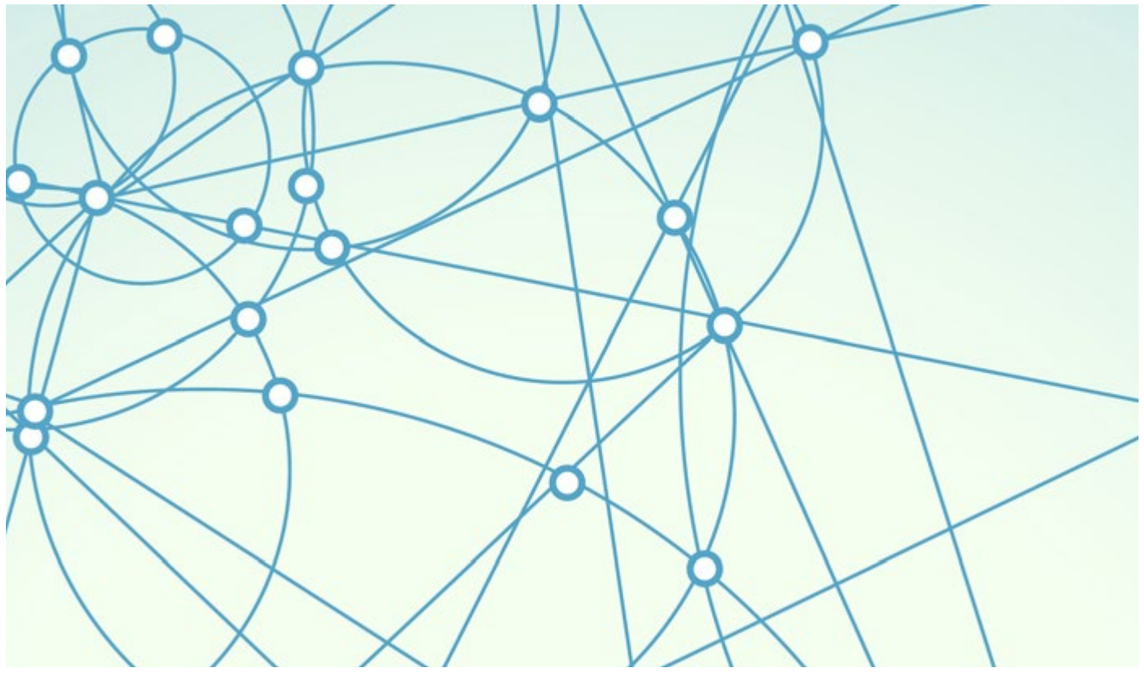
In the engineering industry, now's the time for a bold, forward-thinking company to stand up and challenge the new, established way of accepting everyone's ideas as equally valid. As we imagine our buildings, cities and countries of the future, let's use our hard-earned knowledge not to weakly find something 'good' about an idea, but to be strong and really question what's wrong with it.

These new levels of transparency and authenticity would positively shift the dynamic of the relationships we have with our clients to one that's better for everyone involved in the process. Our role as a professional services consultant in the future would be to tell a client if their idea is not very good. We'd become less about implementing any old idea and instead become the trusted advisor who would take a client's idea and pressure test it, challenge it, critique it and, hopefully, improve it prior to implementation. And if, during this process, we find that their 'good idea' is a bad idea, we should have the courage to say 'no' to our clients and not make it.

We have the chance to reframe our profession and make it far more professional. As the bad 'good ideas' get devalued, our stock will undoubtedly rise. So, in your considered opinion, what do you think: is this a 'good idea' or a good idea?

JUST IMAGINE MEETING AN IMPOSSIBLE CHALLENGE

John Hardcastle



Incredible gains in performance call for us to challenge the status quo. Could we design and construct a hospital that uses half the energy and water of the current most efficient hospital in the world? What about a hyper-performing, digitally-integrated 30-storey high-rise which cost half that of its neighbour to build, but offered the same brand value and prestige? Or, perhaps we could deliver a road network which uses 50% less materials to construct.

Impossible you think? But in our modern world, such performance transitions have already been accomplished – and successfully.These gains have been achieved in some of the most competitive and highly visible brands across the globe – in some of the harshest environments for products to operate.

The engineering teams responsible for these designs are constantly challenged to innovate, design and deliver at the highest level year after year.

Where is this happening? Formula 1 (F1) and aeronautics are two good examples. There are others of course, but F1 captures some of the key principles worthy of examining as a process of meeting a dramatic change that had to occur.

Change everything you know

In 2007, the power units used by F1 teams were V8, 2400cc and costs were spiralling out of control. Then, in 2012, the controlling body, the Fédération Internationale de l'Automobile (FIA), rewrote the technical rule book.

At the beginning of the 2014 season, regulations came into force requiring F1 cars to be powered by 1.6-litre, turbocharged V6 engines. A limit of 15 000 rpm and a maximum fuel flow was required that was 30% less than for the V8 power units in 2013. With the introduction of the turbocharged engines, fuel efficiency was the biggest immediate environmental gain – but performance wasn't sacrificed.

From 2014, all F1 teams were required to incorporate kinetic energy recovery systems (KERS) in their designs. The KERS systems harvest waste heat energy from the rear brakes and the turbocharger to charge a battery pack that powers electric motors. The 2014 KERS system gave the drivers an 80 bhp boost for 6.7 s per lap. In 2015, this was increased and drivers had an extra 161 bhp for 33.3 s per lap.

To reduce costs, teams were only allowed to use five engines throughout the season before incurring a penalty, which makes reliability a high priority for F1 engineers (previously, it was eight). In spite of the technical changes, engine power remained roughly the same – and lap times didn't blow out by 25%!

A similar performance gain is occurring in aeroplane design. According to Boeing's technical data on the 787 Dreamliner: "The aircraft design makes greater use of composite materials in its airframe and primary structure than any previous Boeing commercial aircraft.

Undertaking the design process without preconceived ideas enabled Boeing engineers to specify the optimum material for specific applications throughout the airframe. The result is an airframe comprising nearly half carbon fibre reinforced plastic and other composites. This approach offers weight savings on average of 20% compared to more conventional aluminium designs."

For Boeing, their business challenge was driven as a response to the design and delivery of the A380 Airbus. Boeing customers (airlines) wanted a differentiator from the Airbus: commercial drivers were forcing change and the response wasn't simply to redesign the 747 airframe and compete on plane size or number of passenger seats.

Imagination pushes performance

In F1 and aircraft design, quantum performance gains are already being realised. Management, engineers and design teams made the seemingly impossible happen.

The question to ponder is: do you want to be a business where change is forced upon you, or do you want to have innovation embedded in your DNA at every level? To achieve dramatic innovation, individuals, teams and businesses need a disposition to believe that the impossible is possible.

Waiting until an entire industry moves due to changes in regulation, for example, might well be too late and you might find yourself out of the game before the race begins. So, the question for investors, engineers, architects and government is: when will you start asking your design teams to achieve the impossible?

SOLVING COMPLEX PROBLEMS: FORGET WHAT YOU KNOW!

John McGuire

Type "solving problems" into Google and over 153 million results will pop up in milliseconds. This is both an indication of the digital age; and the sheer scale and complexity of the problems facing our modern society.

Be it diminishing governmental budgets, climate change, the global financial crisis, or even the ageing population, in a digitally connected world, we are able to understand the interdependent nature of our problems better. We also understand that our communities are beset by wicked problems – problems that are difficult or almost impossible to solve because there are just too many variables.

For an engineering services provider, this should be an excellent opportunity. We are inherently problem solvers and our value should increase as the complexity of the problem increases. Why, then, aren't wicked problems being solved, particularly when we have so much data analysis capability? Is there something else confounding the issues?

Typically, when engineers secure a project, as small a team as possible is assigned to undertake the project in order to minimise costs and deliver the project efficiently within the accepted fee. Everyone assigned to the project will invariably come from within the industry related to the client project, and this team is often working across a number of other projects at the same time.

The measure of this project team's success is how quickly they can arrive at a single tried and proven (previously implemented) solution which meets the brief. A project programme is then established, including project meetings. Client interaction is limited to organised meetings and end-user contact is minimal to non-existent.

This process, which is widespread within the engineering profession, is actually contributing to the elusiveness of finding a solution to wicked, complicated problems. The process of putting a limited number of minds on a project with a drawn-out programme is simply too few minds with too long a time frame to consider the full range of the variables likely to be encountered in wicked problems.

What if problems could be addressed in a different way? Here's how:

Forget what you know...
We need to forget what we know and re-engineer the way we think about solving problems. As an industry, we have to change. Communities and corporations are relying on it. We need to adopt the mantra: admitting you need help is the best way to innovate.

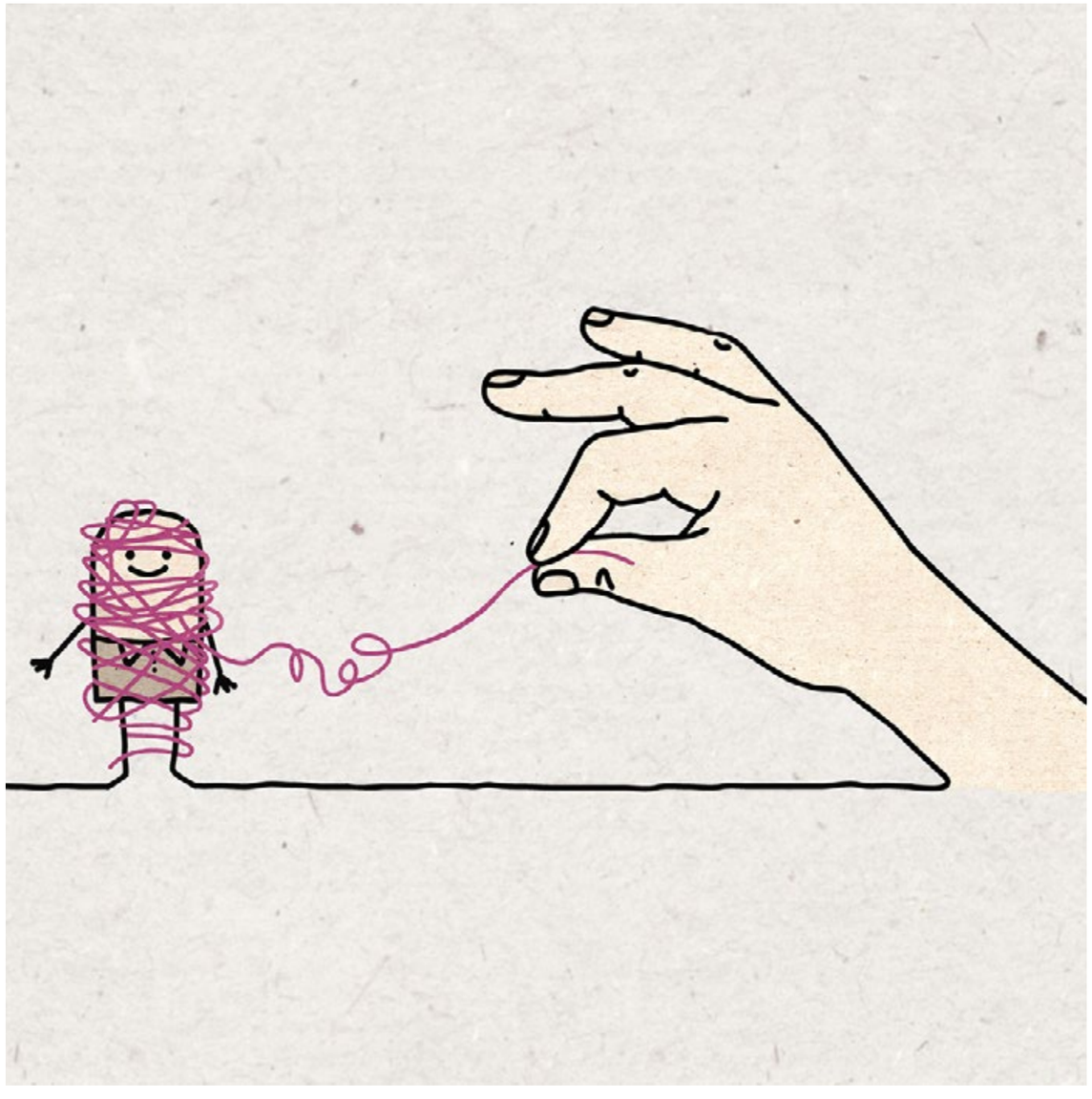
A meeting of minds...
Bringing more people with a diverse skill set into the earliest stage of a project for a very short, sharp period of time creates an intensity of idea generation needed for innovation. Creating a 'design jam' environment allows teams with diverse skills to consider a problem from all angles and to generate more ideas, quickly. Generating multiple ideas is the key to arriving at an optimised solution to complex problems.

Take on a 360º view of the problem...
Importantly, the perspective of the 'professional' team isn't the only input required when solving a wicked problem. Client participation in the idea generation phase, and an end-user focus when considering solutions, should be commonplace. This environment, which could be referred to as a **'brewing room'**, allows a professional team to 'brew' many ideas, and test the ideas generated against one another to build even better, more valuable solutions.

If we are to have any chance of solving wicked problems, or what should actually be termed 'exquisite challenges' or ideal opportunities for innovation, the engineering profession must redefine many of the projects we work on as wicked problems and use this approach as a methodology in itself.

SOON, WE COULD ALL BE BILLIONAIRES...

Kathleen Birchley



In 2014, the ice bucket challenge saw our Facebook feeds swamped with friends and strangers enthusiastically dumping buckets of ice water over their heads in the name of raising awareness for ALS, a fatal neurological disease that attacks the nerve cells. The challenge was dubbed a **'social media blockbuster'** and resulted in the ALS Association receiving $31.5 million in donations in 2015, compared to $1.9 million during the same time period (29 July to 20 August) the year before.

Harnessing the snowball effect of cause marketing, coupled with a narcissistic desire for social medial virality, celebrities, sports teams and individuals jumped on the bandwagon to prove that through the power of emergent technology, you and I can, quite literally, change the world.

During the same year, Brain Games host Jason Silva launched the #RedefineBillionaire campaign. He aspired to motivate individuals to creatively address our current world problems and simultaneously give new and improved meaning to the word 'billionaire'. He explains that billionaires of the future could be anyone "who will positively affect the lives of a billion people." Delivered in his trademark, machine-gun style as one of his "shots of philosophical espresso", Silva invited anyone to solve unnamed global issues by embracing technology and using it in new transcendental ways.

Even before this, John Kluge wrote how we should redefine what a successful billionaire looks like in terms of the quantifiable good they do in the world. Jack Sim continued the conversation by asking us to **"redefine the meaning of success based on relevance rather than the amassing of money"**, and asked us to hold up Nobel Laureate **Malala Yousafzai** as an example of what can be achieved on a global scale without money being the driving factor of success. Although impossible to accurately quantify her humanitarian influence, it's safe to say that she's touched the lives of a billion people in a positive way through her advocacy and activism for the equal educational rights of women.

But a billion is a lot of people. There are currently **over 7.4 billion of us on the planet** and counting! (Seriously, have you ever watched this population counter tick over and not been concerned for the uncertain future of these newborns?) It means that to achieve this new billionaire status, you need to have an effect on over 13% of the global population.

Impossible? Perhaps you've already started...

Before the internet, news travelled slowly and was really only focused on what happened in our local vicinity, which could be reported in a reasonable amount of time.

Fast forward to 2016 and we have global news and information being constantly streamed to most people with a mobile device, **a total of 5.4 billion people will have mobile phones worldwide by 2020**. The impact of what is happening around the world and the impact on the lives of billions of people is instantaneous. In a world where knowledge is power, does increase in awareness bring with it a need for increasing responsibility?

The internet gives so many of us a voice (not always a face). Crowd funding for charity is a powerful example of the gratifying impact of the sum of individuals.

There's a need to recalibrate our brains. We need to leap forward from thinking about what occurs in our local vicinity to thinking 'big' (on a macro scale) about what the impact of our actions could have on the rest of the people we share the planet with.

Our actions all have 'reactions' and by thinking of our own interests at the expense of the person beside you (or the other side of the world from you), you consign yourself to disaster because if everyone else acted in that way, then you too could become vulnerable.

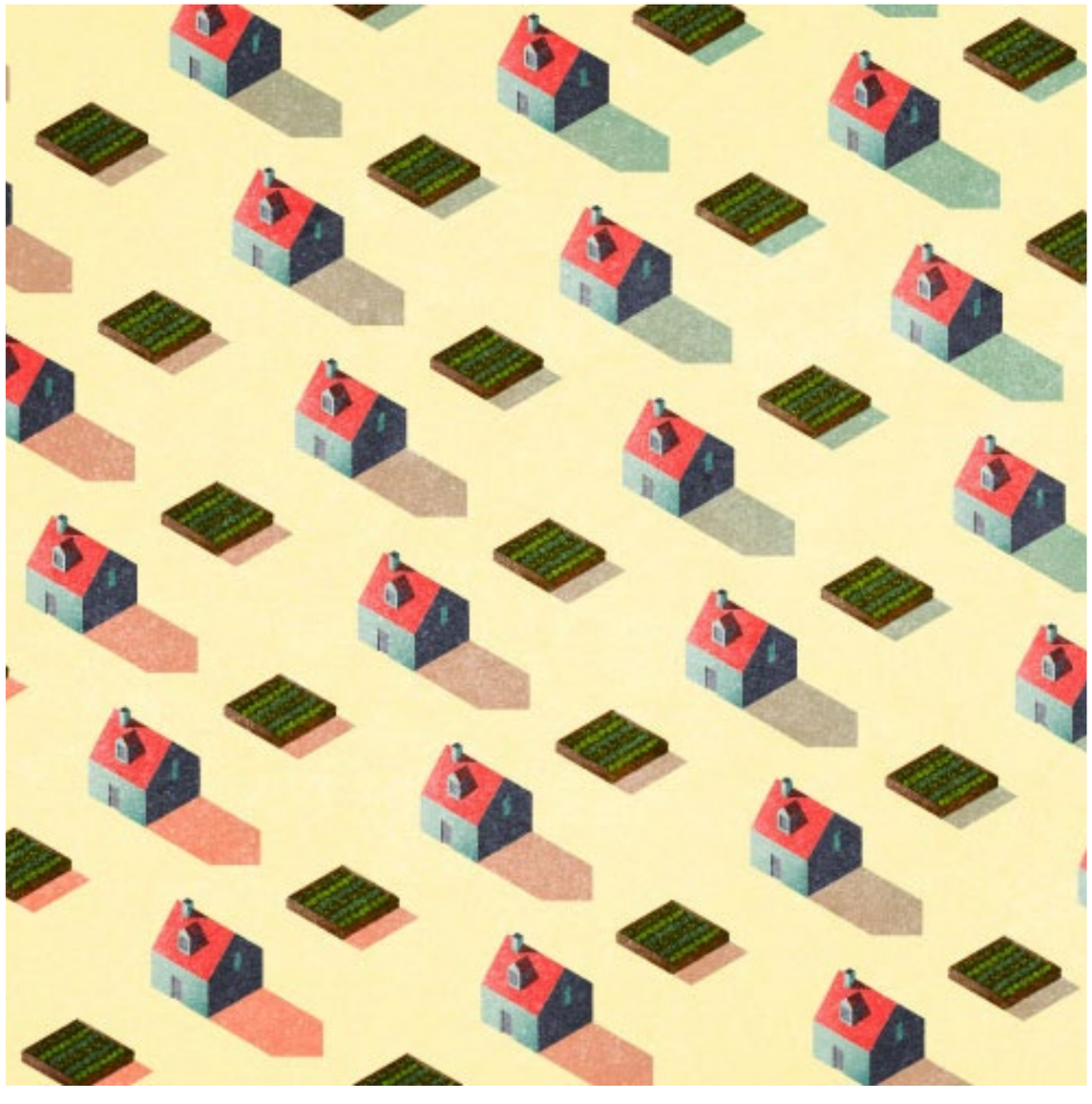
We are the creators of today's emergent technologies that shape our future and, with the fluidity of today's social realms, we need to consider the sentiment behind what we create and what we give a voice to. This is what we will become tomorrow.

There are so many 'billion people' problems to solve...poverty (hunger), climate change, drought, education, equitable health and equal opportunity. The list goes on, but they all have one commonality: thinking 'big' is the first step towards tackling each of them.

Today, our interconnectivity has allowed us a far better understanding of consequential impact. And, if we all did so, we could all take a share in this new 'billionaire' status.

SOLVING WORLD HUNGER: THE KEY TO THINKING BIG IS IN THINKING SMALL!

Rebecca Stapleton & Nick Quinn



The earth is in a bit of a pickle (pun intended). According to the World Bank, we will need to produce 50% more food to feed 9 billion mouths on the planet by 2050. Couple this reality with the **bullying blow of climate change** on the head of traditional forms of agriculture, and panic has begun to set in faster than you can say "severe acute malnutrition".

But here's an idea. What if a big problem like world hunger could be resolved, not through the minds and money of the **Fortune 500 elite**, but through the **collective contribution of ordinary citizens** simply taking responsibility for their own backyard? What if the key to this colossal problem lies not in thinking big, but in actually thinking small (albeit on a big scale)?

With growing human populations adding significant pressure to limited arable land throughout the world, people in the city are finding fresh ways to transform their concrete spaces into green opportunities. One small, ingenious act at a time, the urban landscape is offering **sustainable alternatives** to meet the rising tide of our global appetites.

Prof. Ian Harper, leading economist and Director of Deloitte Access Economics, recently told a captivated audience at the Design as Strategy Forum at UTS Sydney that we are moving from the economics of mass production into the new world economics of mass agglomeration. Harper had the audience transfixed as he postulated that myriad resources can group together from around the world to provide new services, and mini factories with 3D printers located close to their markets can beat mega factories' mass production half a world away.

If leading economists believe that this is the future of economic success in the **industrial world**, couldn't the same theories be applied to solving the imminent world food shortage problem? What if bigger is no longer better? Could smaller and smarter mechanisms solve difficult challenges and outweigh size?

Is there more to urban farming than fad?

Urban agriculture is practised by 800 million people worldwide – representing an incredible 15-20% of the world's food source – and an area of just one square metre can provide 20 kg of food annually. As the world's population rushes towards 9 billion, with 65% of this population in cities over the next few decades, the potency of a veggie garden in every household holds huge implications. If more city dwellers were to feed off the toil of their own soiled hands, a great deal more of the world's food could be grown by ordinary citizens.

Urban agriculture can also open up new streams of redevelopment and investment, as well as a general rise in consciousness around healthy living. Although **land remediation** may be required, there are a number of cases where areas of the city once written off as defunct and derelict, are currently being redefined as blank canvases for agricultural innovation. Abandoned factories and warehouses have been repurposed into successful community garden ventures that build collective morale, as well as healthy lifestyle choices.

Rooftop gardens, aquaculture and greenhouses are an ever-increasing 'good idea'. There is an expensive price tag attached to produce that comes from the farm, and it requires an intensive harvesting and delivery process. Growing products locally eliminates those logistical hoops and hefty markups.

The potential for a ripple effect

But abandoned buildings and back alleys are not the only urban hubs of green innovation. Major international airports are also catching on to the idea by opening their terminals to greenscapes and gardens. Look no further than **JetBlue's veggie patch at Terminal 5 of New York's JFK Airport**. The garden's beauty not only lifts a weary traveller's spirits; its many herbs and vegetables furnish the local restaurants and supply the local food banks with healthy greens.

The exciting question is what if this concept went viral? If the eggplant of an 'airport garden' became as ubiquitous as the macchiato of a Starbucks cafe, the spin-off effect of **social responsibility** around the world would be exponential. The relatively empty space of an airport terminal could be used, with minimal effort, to add brand new solutions to human need.

Urban FarmingTM is an organisation backed by a similar vision. They work hand-in-hand with local people around the world, teaching them how to build gardens in inventive spaces while envisioning them towards **sustainable living**. Their produce feeds the communities and spills over to local food banks. They've also seen these gardens kick-start business growth, job creation, urban redevelopment and global investment – all very good things for communities desperately in need of an economic boost. Altogether, the organisation has given a healthy model of environmental, business and social solutions to a **compounding global conundrum**, and enabled thousands to join the urban farming global food chain.

Similarly inspiring, **One Central Park in Sydney**, designed by Pritzker prize-winning architect Jean Nouvel, is a good example of a building design which embraces greenery. The public park at the heart of the precinct "climbs the side of the floor-to-ceiling glass towers to form a lush 21st century canopy", while "vines and leafy foliage spring out between floors and provide the perfect frame for Sydney's skyline". In addition, motorised mirrors capture sunlight and direct the rays down onto Central Park's gardens. After dark, the structure is a canvas for leading light artist Yann Kersalé's LED art installation, resulting in starlit architecture.

Good news for those without green thumbs

The global march towards urbanisation, compounded by the limp of limited resources, has left in its wake the threat of malnourishment. Considering that much of our arable land is taken and many urban settlements are unsuitable to grow food, people are looking to hydroponics as a viable alternative, as the Dutch have for decades.

This highly controlled method allows for vegetables to be grown in a self-contained environment under optimum conditions. Hydroponics is ideal for crowded city spaces and very effective – rendering good results for even those with 'black' thumbs and very little gardening experience.

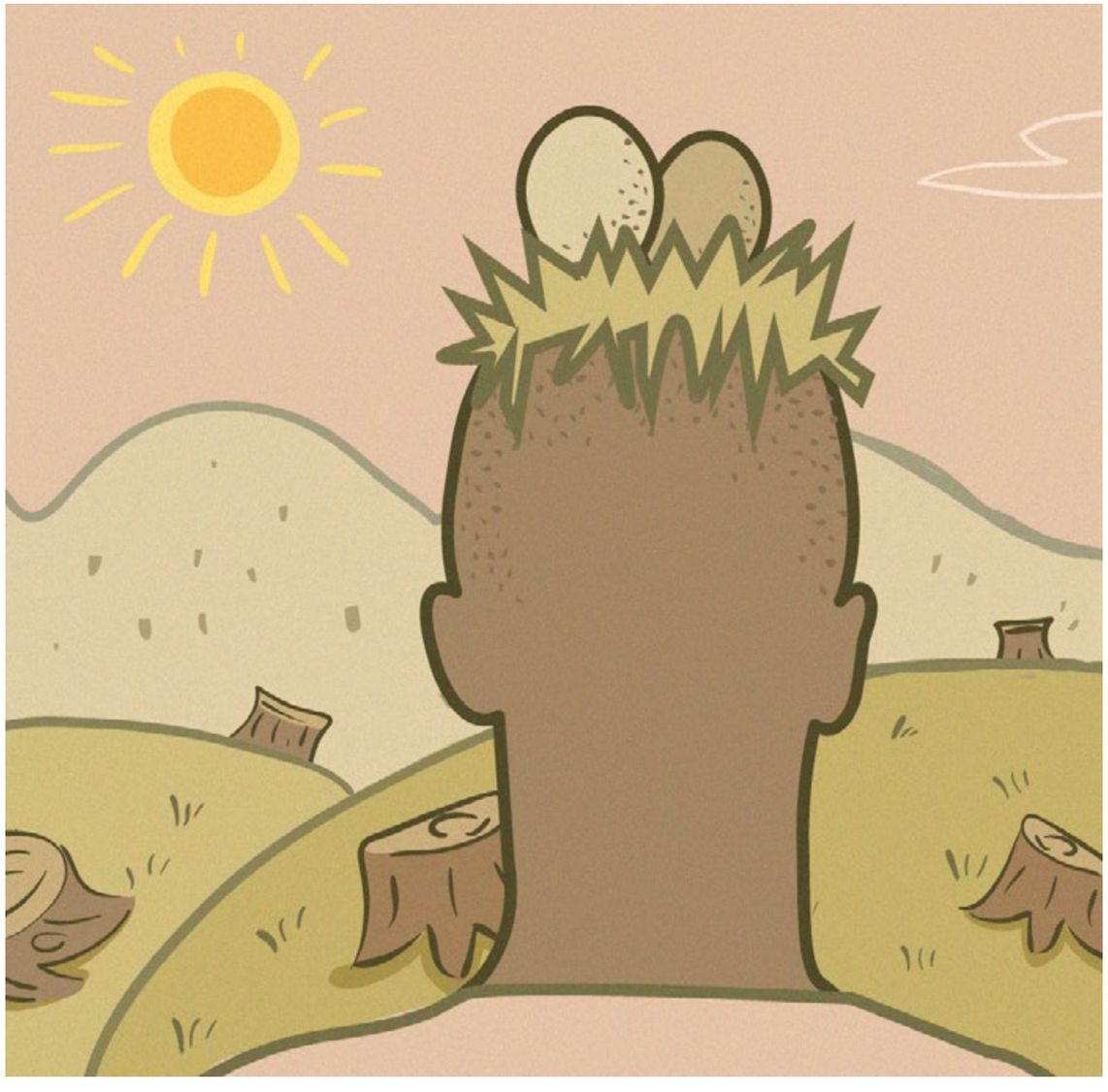
Several countries have implemented Simplified Hydroponics (SH) – a cost-effective technique pioneered in South America that uses simple resources available to the community for producing vegetables. With a minimal carbon footprint, SH may well be the solution to maximising inner city crops in developing economies.

An integrated approach

We find ourselves standing at a precipice today. Do we continue on our current path of traditional large-scale farming, or do we endorse the developing web of small-scale urban farming innovation? The answer is obvious. Our big-scale bulldoze approach will not feed the world alone. An integrated approach to agriculture is needed – one that leans heavily on the small and unseen contributions of countless citizens across our urban landscapes. In future, the economics of agglomeration may just dictate that it's not necessarily the largest (or biggest influencer) that will conquer, but rather the smart, small and connected that will secure victory.

WHO DO YOU TRUST WHEN YOU CAN'T RELY ON ANYBODY?

Amanda Bryan



For thirty years, politicians have been treating the subject of climate change like they would an impossible teenager. No one knows quite how to deal with them, and the strategy to 'keep your cool and talk them down' keeps changing. They're demanding; and they're in your face.

Ever since the **Montreal Protocol** of 1987, governments have been scheming ways to minimise our carbon footprint. At the time, it was throwing away those aerosol cans and declaring war on CFCs. Fast forward ten years, carbon offsetting was heralded at the **Kyoto Protocol** (1997) as the new possible elixir to climate change's impending ills.

But now we sit 20 years down the line, and the reality of implementing offsets sometimes look more like a Diet Coke alongside a double Big Mac meal. They're an all-too-easy way of assuaging the guilt of green gluttony. Offset schemes can often be unregulated and unchecked; their value in terms of genuine greenhouse gas reduction is questionable; and bad habits don't ultimately change by greenwashing consumption.

Moreover, countries can't decide on how to apply them. Take Australia for example, whose policies have played pinball over the last decade, bouncing from an emissions trading scheme, to a carbon intensity system, to a renewable energy target programme, and now to an emissions energy target system. Three words alone (Paris Climate Accord) showcase our global indecisiveness, as we look back over 2017 and turn to face the most significant issue of our future.

All of it seems to suggest that we can't rely on politics and policymakers to find the magic formula. But what if we, the imaginators and innovators of the future, could spearhead something truly sustainable and transformative? What if the future of good environmental policy was in the hands of designers and engineers, backed to the hilt by policymakers and city leaders? Climate change resilience demands a more sophisticated response than simply slapping down carbon credit gauze over unsustainable sore points. We can do better; and we believe the engineers and designers of this world know how.

We may be the problem solvers

History will show that the poorest and most vulnerable people always end up bearing the brunt of transformative change. If you are wealthy, you just turn up the aircon when it gets too hot. If the climate is too dry, your city simply puts in a desalination plant. If food becomes scarce, you **grow your organic veggies in a greenhouse**. But the irony is, you're only worsening the climate conditions for the poor, who don't have the privilege of altering their environment. It becomes a vicious downward spiral, if you're willing to see how your life eventually touches another.

The interesting thing is, as engineers we can see this, but we see what is going to happen as well. We don't have the luxury of ignorance, of claiming "I didn't realise" or "I didn't see this coming". Our training and knowledge tells us otherwise; we're skilled to outsmart the problems and politics. That's exactly why we need to bear big shoulders to bolster the change and provide the solutions that prove right over time.

The off-putting of offsetting

Currently the mainstream thinking is, do your bit of damage but pay your penance by offsetting your impact. So, when that flight from London to Miami puts **2415 kg of CO2 per passenger into the atmosphere**, ideally all that carbon dioxide can be cancelled by funding an initiative that sucks it out of the air.

Carbon sequestration schemes, such as forestation projects, rely upon that wonderfully regenerative process known as photosynthesis, which draws in carbon and pumps out fresh oxygen into the atmosphere. Anyone from **British Airways** to **Leonardo DiCaprio** can be found touting tree planting as the way to cover our tracks these days.

The difficulty lies in knowing the backend story of these schemes. How do we guarantee that these trees were actually planted? And how can we be sure that they'll be maintained for 20, 30, 40 years the same lifespan of the project they displace or worse in perpetuity? Ambiguity aside, it's debatable whether many of these forestry projects are really good for the environment in the long run. **Research** suggests that planted areas weaken the biodiversity, fertility and nutrient content of the soil over time, particularly when tree species are monoculture and non-indigenous.

Consequently, from where we stand, carbon offsetting still falls remarkably short of the bar. "It's something of a wild west at the moment," says Bill Sneyd, operations director of **The Carbon Neutral Company**.

Staying neutral isn't good enough

Rather than slapping down Band-Aids on bad corporate-consumer behaviour, how about changing our designs altogether? We can rewire our current defaults of "doing less harm" and focus our energies on designing something regenerative. This goes a step beyond carbon neutral; it actually imagines our spaces to be environmentally restorative, symbiotic, and life-giving to the world around it.

We'll forever play a game of carbon offset catch-up if we don't radically change the way we design and get a bigger goal than carbon neutral alone. Regenerative ecosystems are the only solution, because they continually stay one step ahead of the climate crisis. Sustaining what we have isn't enough; we need to improve and renew it.

It's easily arguable that we're in a new geologic age. Scientists call it the **Anthropocene,** a human epoch that acknowledges climate change as an avalanche of our own doing. The question now is, if global warming is inevitable, what are we the designers and dreamers of a future-ready world going to do about it?

Imagine what we could do if we learned to replicate spaces that give more than they take. It's doable. Regenerative design is a more honest and estimable response to a global climate crisis that takes the pointed finger and turns it back on itself. In a time when the buck is getting passed at a dizzying rate, good sustainable design is arguably an effective way to stop solving the consequences and start solving the problem.

SUSTAINABLE DESIGN HAS BEEN SOLVED – WHY ARE WE IGNORING IT?

Cormac Farrell

In nature, failures become fossils and survivors are the pinnacle of proven patterns and sustainable strategies for success. Nature and its products, processes, and policies has already solved many of the problems humans have been unable to. Isn't it time we paid attention?

Imagine living in a self-sustaining community in which the building heated and cooled itself; grew its own food; and was built by the residents from natural, fully biodegradable materials. Sustainability engineers and architects have been pursuing this dream for years. It may sound impossible – but the natural world has already done it, over and over again. Isn't it time for engineers to heed the message and seek inspiration from the natural world in their designs?

Flora and fauna are what the Biomimicry Institute calls the original consummate engineers. There is much to be learnt from simply observing the natural world, but so much more if you delve deeper into the lives and systems of the species that share the planet with us.

Aurecon has been running an experiment in biomimicry for the past three years at its Canberra office that has allowed us to gain inspiration from a perfect, self-sustaining community – the beehive. This has led to us ask, aside from their actions and the hive's physical form, are there lessons we can gain from their thinking? Bees don't 'think' through problems in the same way we do, but 70 million years of trial and error has resulted in some pretty superior design solutions. Here are just a few....

Product should be designed to work really, really hard

In the world of the bee, only products that are as hard working as their producers are allowed to earn the right to their valuable space in the hive. Mediocre isn't tolerated, average isn't acceptable. Every product bees manufacture has at least two or three functions within the hive. This is in stark contrast to the single-use approach to products and environments today's companies take. It requires careful thought around how a product will be used, who it will be used by, and how to make it indispensable to multiple users.

Giving back should be 'business as usual'

An understanding that their well-being is based on a symbiotic relationship with those around them is another interesting manner in which bees challenge our status quo. A bee's 'business as usual' involves pollination. Without pollen being moved from plant to plant, a significant portion of our food would cease to exist. The nectar that flowers produce is a form of payment for this essential service. And this is one of the most admirable facts about bees – they don't live at the expense of any other living thing, but instead live off the surplus that they help to create.

It's all about collaboration

Everything about bees is designed around collaboration. They think holistically about better solutions for the hive to thrive and understand that a diversity of role-players is important if a hive is to function in an optimal manner. From the worker bees who

progressively adapt to new jobs, to the queen bee who creates new bees and controls the 'mood' of the hive with pheromones, bees understand synergy and they design their hive around the value each and every member can bring to the overall prosperity of the hive.

With these lessons in mind, it's important to ask how our **built environment** would look if it were designed by a bee and if we treated our city as one large beehive. While this question is only conceptual, it has the power to influence our current reality.

If today's designers 'thought like bees', everyday objects would have multiple functions. Objects as simple as windows would be designed to generate electricity for the building using embedded solar panels. Our home would be a shelter for our security, but also our farm, our supermarket, our workplace and our hospital. **Our cities** (hives) would only be constructed within a district that could sustain them. Our jobs would be meaningful and purpose-driven, with fluid teams working together to bring different perspectives to a problem; thereby arriving at a better solution. We would know and understand the true meaning of collaboration and cooperation.

The more we peer into the beehive, the more there is from which to derive continual inspiration. If small insects can work together to achieve so much, imagine what humans could achieve if we followed their blueprint for achieving our full potential...

IS GOING OFF-GRID REALLY BETTER FOR THE ENVIRONMENT?

Victor Young

If rising global temperatures worry you, you're not alone. Frustrated that fossil fuels still account for around **80% of the world's energy consumption**, thousands of homes have invested in combined solar-battery storage systems. And that figure is expected to grow to **1 million in Australia alone by 2020**. But is going off-grid really the most sustainable choice a consumer can make?

As **renewables** become affordable, more and more people are cutting their wires and adopting a minimalist lifestyle – particularly in rural areas where the cost to connect to the grid is high. For city dwellers, however, powering our lives in this manner isn't cost-effective given the home-ground (i.e. 'sunk cost') advantage the existing grid has over emerging technology.

Living off the grid and expecting the same reliability (99.999%) requires a huge amount of equipment, even for one household. A reliance on the sun and limited battery storage makes it difficult to meet typical evening peak energy needs unless you're happy to go without a television, a fridge and washing machine. Today's batteries last 10 years before needing to be replaced… and then discarded. With the carbon **impact of manufacturing**, supplying and disposing of these batteries – how environmentally friendly is this, really?

All the while, the rest of us who are still connected to the grid are reducing our **energy consumption** by changing wasteful behaviour and using energy-efficient appliances. For energy utilities, this means an oversupply of capacity and lower revenues. Big spending on distribution system upgrades in the last decade has compounded their woes.

It's time to accept the fact that **the energy industry has been disrupted**. If the trend towards going off-grid continues, are we dangerously close to setting off a chain of events whereby existing assets become white elephants – stranded and worthless? Or is there another way? **What do smart businesses do when they've been disrupted?**

They go back to the drawing board and find a way to disrupt the disruptors!

People are likely to continue installing solar cells, even as **government subsidies** reduce, until such time as the grid decarbonises. If the grid doesn't use fossil fuels, then there is limited incentive for people to move to household-level renewables. Founder of Global Sharing Week, **Benita Matofska says**: "Traditional businesses can either fly-the-flag for the status quo and go down with it, or they can be smart about it and enable a new way of thinking, living and doing **sustainable** business. Those who do will survive and thrive."

Just one of the opportunities for energy utilities derives from the notion that household renewable assets needn't always be consumer-owned. Companies like **SolarCity** are emerging, which provide solar panels that you can lease rather than buy. Should energy utilities focus on looking for ways to work with start-ups to facilitate the roll-out of solar and storage at scale?

And who said that the renewable energy generated by each household can't be shared? Imagine subscribing to energy via a sharing platform and using an app to trade energy with other people and businesses. **To make this future smart city scenario possible**, we need to continue to invest in emerging technologies, to commercialise the ones that show promise, and to optimise the ones we already know work well. **Tesla's PowerWall** is today's high profile home battery storage product, but there's no shortage of players lining up to compete, ultimately putting downward pressure on costs, which will drive further mass market appeal and adoption of these smart solutions.

And let's not forget the power of community... **we need only look at today's smartest cities for inspiration**. The successful **citizen solar power plants initiative** – a partnership of Vienna, Austria and Wien Energie – offered locals the opportunity to **invest in the city's solar plants** to help achieve its renewable energy objectives.

The switch to renewable energy has already been flicked. Smart utilities that are willing to drive change toward a cleaner future will prosper – but it's going to take the turning off of a lot of old paradigms to do so.

THE UNAVOIDABLE TRUTH ABOUT AVOIDING DEATH

John McGuire

The idea of living forever (avoiding death) is one which has been a fascination of societies for centuries. In the 1800s, the average life expectancy was just 35 years, but today's average American man can expect to live to 75, and woman 80. Life expectancy has more than doubled – could it do so again and what if it did?

Regenerative medicine has been practised for decades. Procedures such as knee and hip replacements effectively replace worn out body parts. Transplant surgery does the same, as does the treatment (and cure) of many cancers.

Regenerative medicine today, however, is fast approaching an inflection point. A point where we will be able to significantly increase longevity through advances in genetics, improved diagnostics and nanotechnology. Genetic engineering will make it possible to grow body parts from a person's own stem cells, effectively creating a 'spare parts' store for our bodies.

Silicon Valley is taking it a step further. Peter Thiel, founder of PayPal, wants to live to 120. He is one of a growing number of tech billionaires who want to solve one of society's most wicked problems yet: ageing. He and a number of other Silicon Valley masterminds want to use technology to upgrade the human body, the most complex piece of machinery yet, through mechanisms such as reprogramming a person's DNA using 'nanobots' to repair our bodies from the inside out; and 'downloading' the content of someone's brain so that it can stay alive long after the body which it occupies has expired.

Although all of this may sound far-fetched, so did the advent of the TV and laptop when only radios and calculators were in use. But unlike the TV and laptop, the impact of indefinite longevity is a subject we have largely avoided, in much the same manner as we avoid discussing our own death.

If living to 120 is made possible in the near future, what might we be doing and what impact would this have on the world around us?

As is the pastime of many from the older generation, complaining about the generation gap will take on amusing nuances. "Back in my day we used to actually talk to each other via social media; we could like each other's comments… now we're all merely wandering around mute-faced with wristbands that read our micro-expressions. This generation doesn't understand hard work because the robots are doing all the lifting and thinking for us. They aren't in touch with themselves and have to look at their wrist to tell them how they're feeling."

In addition, technological developments will mean that many traditional labour and automated tasks have been replaced, allowing people to focus their collective minds on solving some of the world's most wicked problems such as poverty. We would have time to develop a cognisance that has only been experienced by a few.

But there is a flip side. Worryingly, our taxation system would come under extreme pressure, having not been geared toward supporting a very large aged and retired population of 'baby boomers'. If we don't have the taxation revenue, we won't be able to build the infrastructure needed to support the population. The mathematics simply do not add up.

Likewise, our health systems are not designed to cater for large chronic disease cohorts. Our existing infrastructure (road networks, agriculture, power, water etc.) is already struggling with current populations and urbanisation, having been based on standard assumptions for birth and death rates. These would quite literally 'break' if there is a significant increase in longevity. In many ways, living 'forever' may sound appealing but, in the ageing conundrum, are we simply birthing a plethora of even more wicked infrastructure; healthcare and technology problems for the next generation of engineering service providers to solve?

As a community and society, we don't like having discussions about death and dying. We avoid and ignore the topic until it's too late. Is the same true of longevity? Quite clearly, where longevity is concerned, it is no longer a question of "could we?" but "should we?" With death fast becoming something we can avoid, asking whether "we should" will be unavoidable.

THE TICKING TIME BOMB IN HEALTH IS BEING IGNORED

Susie Pearn

The World Health Organisation (WHO) estimates that 140 000 people die annually as a direct result of the climate change that has occurred since the 1970s. As the earth's temperature continues to rise, we will fast reach a tipping point where the climate will be the most dominant influence on human health and our health systems, far outstripping current drivers such as the aging population and lifestyle related diseases.

By 2050, climate change will contribute to doubling the number of people living in water-stressed basins; halving rain-fed agriculture in some African countries by 2020; increasing the number of people at risk of malaria (170 million by 2030) and dengue fever (2 billion by 2080); as well as increasing exposure to coastal flooding by a factor of 10, and extreme drought by a factor of 10-30 (WHO).

In addition, a 40 cm rise in sea level is expected to increase the average annual numbers of people affected by coastal storm surges from less than 50 million at present to nearly 250 million by 2080.[1]

If this happens, the impact of heat stress conditions and upper respiratory tract ailments, as well as drought and hunger, will be profound. Our health systems are currently struggling to cope with the influx of chronic diseases that our lifestyles and aging are creating...what chance do they have when the true impact of 'climate disease' hits them?

In the here and now, our densely populated cities, especially those which experience an urban heat island effect, already face extreme heat and degraded air quality. In New York City, each single degree (Celsius) increase in summertime surface temperature has been associated with a 2.7–3.1% increase in same-day hospitalisations due to respiratory diseases, and an increase of 1.4–3.6% in hospitalisations due to cardiovascular diseases.[2]

In Hong Kong, there is a daily broadcast of what the pollutant index is and on some days, it's recommended that parents don't let their kids play outside. Coupled to this, food and waterborne infections show a direct correlation to rising temperatures.

Put simply, we're headed for trouble and a changing climate will soon magnify the already significant effects of extreme weather on our public health system.

Our current hospitals and health systems are not designed to cater for climate disease. And, while the predicted wave of climate disease is still a way off, hospitals are presently being designed with little regard to how they will adapt. Adaptability in **healthcare design** is probably the most forward-thinking strategy our health departments and hospital designers can implement.

As yet, no one seems to have done the maths around the impact climate-related health diseases place on our current burden of disease globally, and what this burden may become if the world were to become 2 degrees (Celsius) warmer. Arguably, there will be a need for different models of intervention and treatment, with new research and innovation to address climate disease.

When it comes to health, 'Salutogenics' has become fashionable i.e. an increasing focus on factors that support human health and well-being, rather than on factors that cause disease. But, in focusing on designing the **built environment** to support human health, we've forgotten that if we do not start to design for wellness of the planet, there is little point in designing for wellness of the body.

It's time for health leaders to become climate leaders. If we want to see lasting and measurable change, health departments will have to heed the climate debate and then start synthesising what this will mean to the design of the facilities they are delivering now. We will have to start investigating how our health systems would cope with this changing disease cohort and start asking the question: "How will our facilities and health system adapt?"

The leaders of our health systems need to understand that there is an intrinsic inter-relationship between human health and **sustainability** that exceeds any cursory green agenda. We have to take being green seriously. For health practitioners, it must move beyond merely being environmentally responsible to actually protecting human health, which is in truth the very foundation of the Hippocratic Oath.

Deciding that sustainability measures are unaffordable and treating 'environmental sustainability' as if it is an issue that is an adjunct to **building design** has to cease. Our design of health facilities today, and indeed all facilities, has to be capable of changing drastically. If environmental sustainability is directly linked to human health, we may need to spawn the concept of 'health credits' instead of 'carbon credits' and start to value those credits differently, given the potential to reduce the cost of healthcare in future.

Back in 2000, the **WHO predicted** that 'climate related health diseases' could have a significant impact on our burden of disease, yet our health departments and health operators are blind to the biggest risk to our health systems: the environment.

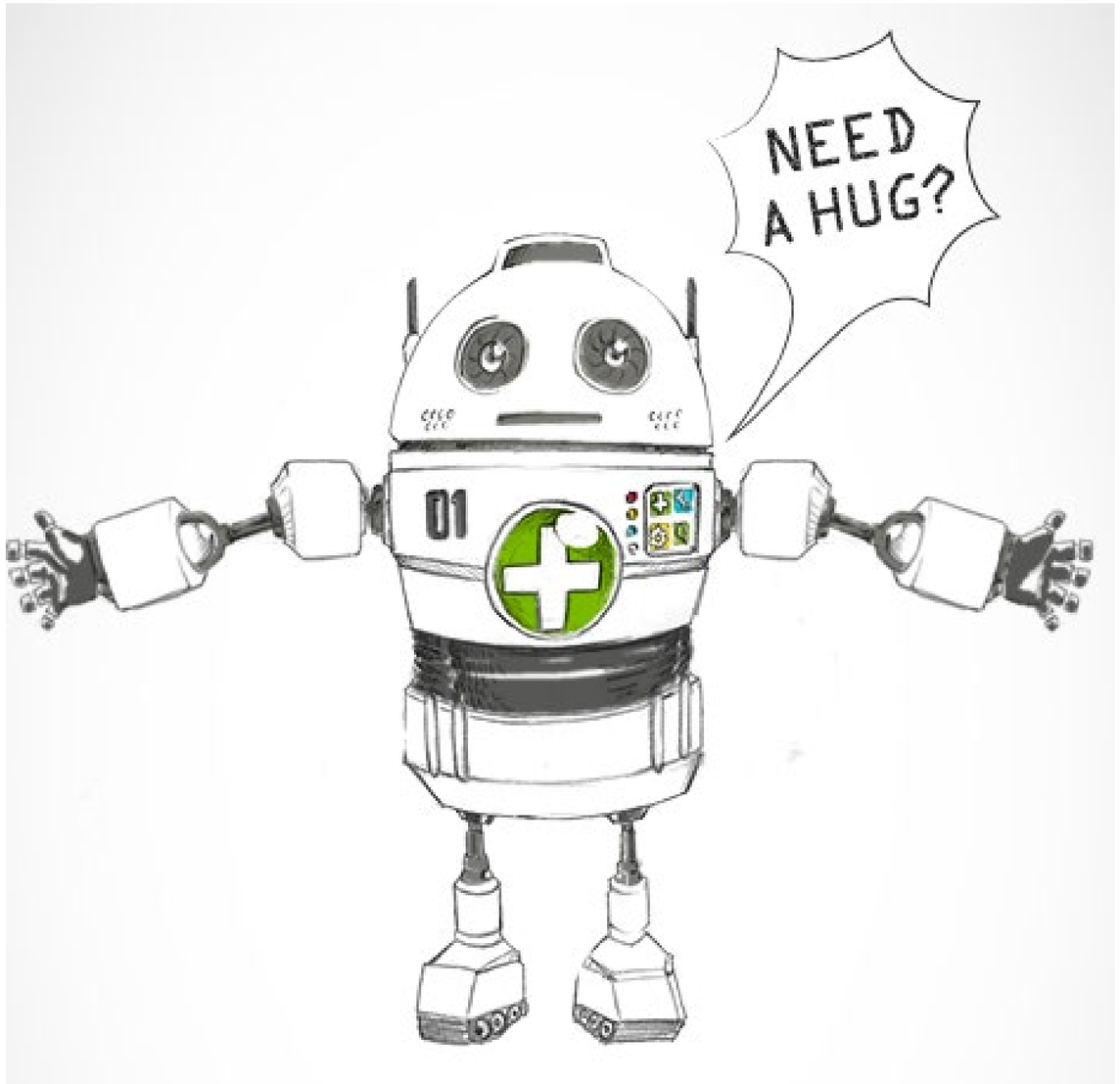
There is an innate link between the environment we live in and human health. We cannot afford to wait another 15 years to start asking what role the designers, the private health industry, and the general public can play in changing our course.

[1] Climate Change, Sustainable Development, And Human Security: A Comparative Analysis, Dhirendra K. Vajpeyi, 2013

[2] Lin Et Al, 2009

THE SECRET TO WELLNESS: CAN BETTER DESIGN 'CURE' ILLNESS?

Susie Pearn



"IF YOUR HEALTHCARE SYSTEM IS ILL, CALL 000. PRESS 1 FOR AN ENGINEER, 2 FOR AN ARCHITECT, 3 FOR A TRANSPORT PLANNER..."

Could interdisciplinary design focused on wellness disrupt conventional healthcare provision to solve an intensifying global crisis? The untapped potential for design to revolutionise how we deliver health is boundless. Combined with a shift to preventing ill-health through wellness, design could take healthcare out of the hospital with transformative effects.

Take the **built environment**. Mediated by design strategies and critical systems, its fabric exerts a powerful influence. It is the stage where almost all human life is played out. It offers shelter, dictates movement, regulates utilities, facilitates action and even elicits delight.

What if that power was extended to the everyday nurturing of wellness in our communities? By prioritizing wellness in the home, on the road, at work and at play, how dramatic would the impact be on population health? Can research into salutogenic design converge for the public good? In short, will policymakers call on different experts for radically different, exponentially beneficial solutions?

A major target has been the environmental and behavioural determinants of ill-health. Digging through **WHO** data, the statistics are overwhelming.

- Air pollution, especially from cooking with solid fuels in the home, accounts for 4 million premature deaths a year
- **Climate change** is expected to result in direct costs to health services of between $2-4 billion a year by 2030
- Avoidable factors such as social exclusion, loneliness, standards of living, working conditions, and poor physical health contribute to an estimated 350 million people of all ages suffering from depression
- Globally, 19% of all cancers are attributed to the environment, especially in the work setting, resulting in 1.3 million deaths annually
- Work-related health problems result in an economic loss of 4–6% of GDP for most countries
- Almost 1 in 10 people in the world fall ill after eating contaminated food and 420 000 die every year.

- Physical inactivity, alcohol misuse, tobacco use, obesity (itself entirely preventable) and unhealthy diets contribute massively to non-communicable diseases, killing 38-million people a year
- Insufficient physical activity is 1 of the 10 leading risk factors for **death worldwide**
- Road traffic crashes kill about 1.25 million people a year, and are predicted to rise to become the seventh leading cause of death by 2030

With numbers like these, even marginal improvements could have enormous impacts. But with a growing population and changing demographics, simply staving off ill-health is no longer enough. It's time to turn our attention to wellness. More importantly, we need new ways to actively engender population-wide well-being.

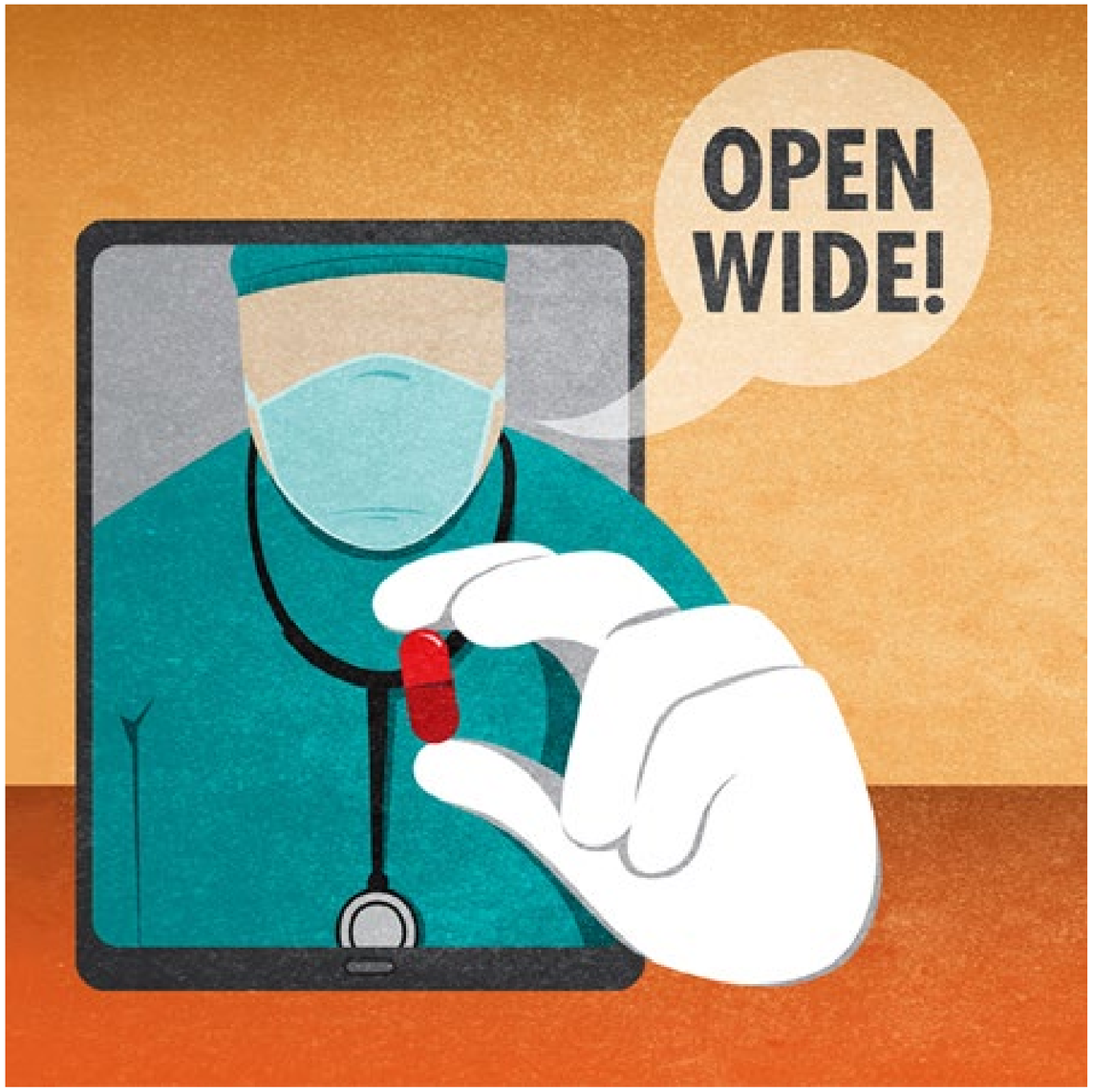
Harness research from the built environment. Visualise communities designed to discourage car use by keeping essential facilities within easy walking distance. Think of food grown locally rather than shipped halfway around the world and placed in cold storage for months. Envision electric vehicles to keep the air quality clean. Picture new cycle paths on 'left over' lanes with the advent of capacity-increasing **autonomous vehicles**. Conceive public spaces that dispel loneliness and encourage community engagement. Conceptualise a city designed with salutogenics, the pursuit of wellness, as its key guiding principle. Just imagine.

There's no doubt this is a huge challenge. Lone voices from single disciplines by themselves can't catalyse change. It needs the input of designers of all kinds, to say nothing of healthcare providers, public health administrators, universities and policymakers. The technical needs to be addressed alongside the philosophical, ethical, cultural, economic and political.

Nonetheless, with the rising emergency in healthcare provision around the globe, do we stick with the old or try something new? So, go on: who you gonna call?

POPPING 'SMART' TABLETS: THE CHANGING FACE OF HEALTHCARE

Susie Pearn



Just imagine if the only tablet you needed was a smart tablet. Can our iPads, Galaxies and Xperias keep us well so that we never have to reach into the drugs cabinet? As the interface between people wherever they happen to be and a **digitally joined-up, super-slick healthcare system**, this idea promises to shift the paradigm away from treating illness in hospitals to maintaining wellness at home. But it's all wishful thinking without a properly surveyed route map.

There's no doubting the allure of this vision. No more inconvenient time off for simple medical consultations; you can facetime through your tablet. Chronically ill loved ones' vital signs can be remotely monitored to give early warnings of deterioration. Your child's medication app can interface with their teacher's, protecting them from being given the wrong dose at school.

Most basic of all, no need to give your name, age and history to every new **healthcare** worker you encounter along the care pathway. Combined with genomics, personalised medicine and companion diagnostics, enabled by technology, we are far more empowered to look after ourselves than ever before.

The digital device is a powerful tool for providers and administrators too. With it as the interface to big data analytics, we can wave goodbye to traditional intuitive practice and hello to dashboards displaying accurate real world diagnostic aids. Time and resources can be freed up as **expert systems take over specialist work**, allowing jobs to be reassigned safely to more abundant, less highly qualified people. Error and unnecessary testing can be reduced which, apart from saving lives, can significantly reduce the cost burden for public health.

All the while, **autonomous sensors and algorithms** can monitor public health and help control epidemics faster than ever before. But to harness the true potential we need digital bit owners to relinquish their privacy in matters of life and death for the greater good. It is in the hands of individuals to open the door to better population health, research and **create advances in preventative health and treatment**. So what and why are we hiding?

With the cost of healthcare outstripping economic growth and the impact of chronic diseases alone set to balloon to **$47 trillion in the next 20 years** according to the World Economic Forum (WEF), health leaders and policy makers are at a tipping point.

We have a once-in-a-generation chance to capitalise on the digital paradigm's potential to do more with less. In immature healthcare systems around the world, the prize is even greater: a golden opportunity to **leapfrog the present to be ready for the future**.

The impact of all this on how we plan future healthcare facilities could be profound. In planning new **infrastructure**, the longer we extrapolate from the past without accounting for the digitally disrupted future, the higher the risk of building white elephants that will be a burden to future generations.

Predictions all see health systems focused on keeping people well in their homes, supported by wearable, ingestible and ambient monitors. They see more and more care being provided outside hospital walls. So, should we be master planning our hospitals to shrink rather than grow? Should we in fact build wellness centres, not hospitals (as **a recent SEA report recommends**)? Will we need to convert our hospitals to research centres?

How big do our **data centres and ICT infrastructures** that support the digitisation of health need to be? How will the flow of patients change through the emerging care pathways? Will we still need waiting rooms? Should we be building hospitals that can convert to call centres? At the very least, we should be leveraging the power of computing to understand and optimise these options. Should specialist healthcare infrastructure be needed, it must be adaptable.

The future is here. Progress in digital is under way, but fragmented, with investors popping whatever entrepreneurial pill happens to be available from the headshop. As the WEF says, businesses see the rewards but are **grappling with the risks**, unable to see the implications of changes to customer expectations, cultural norms, and regulation. It is not yet translating to fundamental changes to health services and infrastructure. What's holding them back is the lack of an overarching strategy.

To say the route to smart tablet wellness is tricky is an understatement. We need integrated thinking and fresh perspectives.

These challenges need to be addressed by industry and **government** leaders to unlock the substantial potential digital offers to society. A spoonful of integrated strategy will make the obstacles come down, and guide us safely to our smart tablet future.

CAN WASTE SOLVE THE WASTE PROBLEM?

Tim Plenderleith

Whoever said 'happily ever after' was just the stuff of fairytales? These days those words are written into the soles of Lionel Messi's cleats. (Or at least, that's the idea.) The "Sport Infinity" range by sports apparel company Adidas uses worn-out cleats and, by combining them with scrap materials from other industries, reimagines them into high quality new shoes.

"The football boots of the future could contain everything from carbon used in aircraft manufacturing to fibres of the boots that scored during the World Cup," Adidas said **in a statement**. It's called infinity recycling – one of the many good ideas wrought by circular economy thinking – and it may just be the Sunday game norm someday.

With three billion new middle-class consumers expected to enter global markets in the next 15 years, we can expect **three billion more hungry appetites** for the **resources** and **infrastructure** required to meet their lifestyle demands. Currently, our economy is run by a 'take-make-dispose' linear approach that generates a breathtaking amount of waste.

According to Richard Girling's book Rubbish!, 90% of the raw materials used in **manufacturing** don't even make it out the factory doors, while 80% of products made are thrown away within the first six months of their life cycle. The resource crunch is more like a suffocation, with our incriminating fingerprints all over the planet's throat. The extractive industry's approach is unsustainable – raw materials are being depleted quicker than they can regenerate.

The circular economy may be a highly practical solution to our planet's burgeoning woes. The idea behind a circular economy is to rethink and redesign the way we make stuff. Rather than ditching your worn-out old jeans, **send them into the factory for recycling and upgrade to a new pair**. Done with your old iPhone 5? Reconsider buying the **Puzzlephone**, which can be easily disassembled, repaired and upgraded over a ten-year lifespan. Basically, there's no such thing as waste in a circular system – all waste bears the raw materials to become something else. By finding fresh, **creative ways** to use the same resources, a one-way death march to unsustainable collapse is inadvertently avoided.

Could we halt the downward spiral by using waste to solve the waste crisis? With **McKinsey** rolling out projections as high as $1 trillion to gain from a closed-loop economy, circularity seems to have our 'thumbs up' in principle. The truth is however, we are a far cry from adopting its practical reality in our design-distribution streams. So, how will we get there? If the circular economy is indeed the way of the future, what needs

to change now to usher it in? Could the circular economy define the end of the extractive industry as we know it?

We have to believe in a new buying power

The Kingfisher Group has much to say on the future shift in consumerism, and they're using power tools to say it. Rather than buying that drill that is used on average six minutes in a year, why not rent it for the day? Surely it would be better value for money on that rare occasion when a hinge is loose? Their company, along with others like Mud Jeans and Philips, are paving the way for new ideology and design around products and how we relate to them.

Consumerism is moving to stewardship, with the emphasis on service over product acquisition. So, in other words, the 'pay per use' contractual agreements associated with smartphones could extend to washing machines, DIY equipment or even Levi jeans. Access, not ownership, to a product will be the new trading power. This will launch fantastic new intelligent systems to undergird the process. But it will firstly require a good deal of unlearning and open-mindedness for us who have been immersed in linear thinking.

We have to up our game

Within the former linear structure, sales were the success markers. Manufacturing and design simply had to align just enough to make the product sparkle, shine and ultimately sell. They didn't have to consider the total fossil fuel emission of production or its biodegradability in landfill. The product's recyclability was not in question. It was only the swipe of the credit card.

A circular economy, however, is really complex. It accounts for a product's entire life cycle in its design. Systems-level redesign and skills we haven't yet imagined will be needed in order to recall, repair and reincarnate products into an upgraded former self. Rapid innovation will generate IoT platforms and seamless technologies into new services and product offerings. The need for ongoing research and development will drive STEM (Science, Technology, Engineering, Mathematics) disciplines. We need to prepare for these complexities, so that the added layers of life cycles are anticipated in tomorrow's briefs and an egg-on-face situation is narrowly averted.

We have to collaborate

Circular solutions will only realise sustainable, future-proofed ecosystems if everybody is on board. Perhaps even more important than the engineers and designers, governance and regulation are crucial in endorsing these processes. Redesigning supply chains and business models require robust round-table discussions between businesses, universities, social groups and policymakers.

Initiatives such as the Ellen MacArthur Foundation's Circular Economy 100 embraces this idea that closed-loop ambitions can never be achieved by working in isolation. This group ties together supply chain leaders, industries and geographies. From designers to academics, CEOs to city mayors, people are locking heads and sharing their complementary expertise. The result of which is a more effective and holistic solution that generates wins for both the planet and our pockets.

Linear thinking can't meet the needs of the emerging circular economy. However, all is not lost. Draw a straight line long enough and it would actually envelop the globe, paradoxically making a circle. What we need is linear thinkers to be open-minded to extrapolate their thinking out far enough in order to, ultimately, draw the same conclusion – that a circular approach is actually where all roads lead. Going forward, drawing circles around our consumer behaviour may be the best way to draw the line.

OUR PLANET'S GOT DIRTY LITTLE SECRETS!

Ellen Worthington & Sharon Manssen

Polls can be a real drag. Just when we start thinking we're something special, we read a survey that knocks us down to size. So, while the Aussies have earned some serious bragging rights for **offering the world WiFi**, they also have to swallow a **survey** that ranked them in the top five **waste producing nations**, on a per person basis. And while Britain pioneers biomedical breakthroughs, it will have to address an estimated 7.3 M tonnes of household food waste thrown away in 2015 – up from 7 M tonnes in 2012.

The reality is, we are forging the future at a rate so meteoric that there seems to be no time for looking back. In one way, our genius has landed us in fields of study and innovation unimaginable. Yet, in another way, we have never been dumber when it comes to the basic ways in which our actions affect the world around us. Our **21st century achievements** may merit a big pat on the back, but they also demand we look down to read the price tag they place on our planet.

What we should be doing is panicking!

A call for consequence

In our streamlined and super convenient consumer culture, there's a considerable disparity between what we do and what our doing does to the earth. We flush the toilet, without thinking that it takes an average 13 litres of **water to fill it up again**. We throw our rubbish in the dustbin, disconnected from the reality projecting a global 2.2 billion tonnes of landfill waste by 2025. We buy food and clothing with no concept of their provenance.

The order of the day is 'out of sight, out of mind', because, in fact, we can afford to think that way. The landfill, the sewerage station, the intersection between river and wastewater… these offensive spaces of human squalor are just too far over the hill for the average first-world consumer to see. As a result, our disposable lifestyles go unchallenged with no sense of consequence or call to pick up our abominable mess.

The catalyst of crisis

The truth is, like it or not, we are seriously in the dwang. How else do you interpret it, when the **Global Footprint Network** calculates we need 50% more Earth than we currently have to continue operating at this economic pace? Beyond a matter of opinion, the sheer numbers speak for themselves; the Earth simply cannot sustain our nasty habits.

Scientists and economists, in spite of all their compelling arguments and incentives over decades, have been unable to sway human behaviour. (Look no further than the average accelerating rate of global CO_2 emissions as a case in point.) The only appropriate response, if we are to rise to this colossal challenge, is to call a crisis.

Paul Gilding, activist and advisor on **sustainable economy**, explains its catalysing power to unleash immediate action: "When we feel fear and we fear loss, we are capable of quite extraordinary things." We see the rallying resilience of the human spirit every time the rubble of tragedy is upturned. We also see how crisis can move the mountains of political economies overnight. (Take the bombing of Pearl Harbour, as an example. Just four days later, the entire civilian car industry was frozen and funds redirected for the rationing of food and energy). In order for audacious but achievable action such as Gilding's **One Degree War Plan** to counteract **climate change**, global experts and political leaders need to call the crisis now. But, in order for humanity to outwit the odds against us, the responsibility to properly panic is on all of us.

Do your bit

Heart attack victims, or others who have had a 'near death' experience, will tell you that it is often this massive jolt to the senses that spurs them to take action to change their lifestyle drastically by losing weight, working less, eating better, exercising, etc. In other words, it is only the reality that they have a finite (and fragile) existence and that they have something precious (their life) to lose that sees them realise that they have to do something so as not to lose it.

Perhaps, when it comes to our planet, we collectively need a jolt, and a very serious one, to get us all on board to effect positive behavioural change.

So let's panic, and panic well. And then let's harness our panic for good – using its power to unify, to inform and to mobilise mass response to the greatest problem the world has yet seen: its ability to self-destruct!

PLANET TRUMPS PROJECT IN PRECINCT DESIGN

Martin Smith

Animals have a way of beating the odds by using what's been given. If it's not the one-inch cathedral termite that architects a 5-metre home on the Australian outback, it's the beaver who rearranges the river's flow with its bucked teeth. All around us, nature is giving and taking, budding and dying, to keep the same centuries-old symbiotic song playing.

Once upon a time, humans were no exception to this rule. Arctic Eskimos were given the option of ice or more ice, and so igloos were born as dome-shaped structures that miraculously had you peeling off some layers when blizzard storms blew. Populations in the tropics adapted to the heat and humidity by building lightweight elevated timber

structures with wide openings and breezeways to allow cool night air to permeate their houses and remove the heat build-up from the day. Generally, we were pretty good at staying in step with the environment for a very long time.

But somewhere along the way our intellectual superpowers meant we didn't have to work with only what Mother Nature had dished up for our disposal. We could actually change it. And the greater our ability to re-engineer our habitats to our advantage, the more detrimental it tended to be to our habitats. One project at a time, we have been rearranging our built spaces to satisfy our immediate demands, and the **casualties in our wake have just been crammed under the carpet**.

Let's face it, if you've got money, you can beat your own ecological odds. When it's hot, turn up the air conditioning. If there's drought, suck the water out of the ground or squeeze the salt out of seawater, and voila! – no rain dance needed! The paradox, of course, is that by doing these things we only make it hotter and drier for the rest of the world, with the most vulnerable populations bearing the heaviest blow. Make no mistake: **there always is a price to pay**; it's just a question of who pays it.

In a world of no constraints, can we be trusted not to swing the pendulum hard towards the easy solution? But can we actually be trusted to take the time to find the middle, where we uphold both the immediate and long-term picture? If we're going to find this optimum balance, we're going to have to think precinct over project and planet over precinct. We're going to have to step back and look at the overall ecosystem we are building. Our job is not merely to meet the brief, but to transform communities into a better picture than the one we inherited.

Building our hives

For centuries, we have been upgrading our own hives. We live, eat and sleep inside the security and comfort of our homes. We learn inside the four walls of school, college or university. Our careers are often crafted over time inside a custom-designed building. We gather food in built biospheres called malls. To get around, we carve out roads that criss-cross canyons or cut straight through mountains. When we want to exercise, we join air-conditioned gyms or visit sporting venues. Slowly over time, we are re-engineering the landscape to serve our habits and lifestyles.

But each individual design has wide-scale impact that ripples through society. When a double lane road is thrown down to get traffic flowing, it also severs the natural flow of that community. When a shopping centre comes to town, suddenly the pleasant chats around the neighbourhood corner store dissipate, and the social glue that forms the community fabric begins to break down. Spaces slapped by mega malls and high-density roads are no longer intuitive and integrative, but disjointed ecosystems that cut through the sweet intangibles that make community what it is.

Going beyond the brief

Project by project, we are reinventing our world. We meet the brief (we may even wow the client and one-up it), but if we treat that project as an isolated design, then, to some degree, we've actually failed.

With climate change and urban influx breathing down our backs, we can't afford to think in boxes anymore. We have to align our work to a bigger story. We have to think of every project as part of the tapestry that interweaves the social fabric of the community in which it is placed. We need to put the "soul" back into project briefs, where human interaction can flourish and community is nurtured. When was the last time a project brief had a requirement to increase the amount of serendipitous moments of human interaction?

Technology, public works, architecture and policy all have a part to play in the push towards **sustainable urbanism**. The goal being "sustainable and liveable", the idea is to live simpler and far more connected as people and built environments to the natural world around us. And thanks to this rising conscientiousness, cities are starting to rethink the way they build and plan, so that green high-performance buildings and infrastructure are connected by walkways, cycling paths, bus routes and other transit systems with a **low carbon footprint**.

But the reality is, these pockets of progressiveness are still rare. Even if fantastic innovations are remodelling the neighbourhood, rarely do they 'talk' to the core components of urban planning and together build an overall vibe, a sense of place that pulsates with purpose. Usually they hit the technical and ideological targets of the building, and that's about it.

Rebecca Solnit put it this way: "In great cities, spaces, as well as places, are designed and built: walking, witnessing, being in public, are as much part of the design and purpose as is being inside to eat, sleep, make shoes or love or music. The word citizen has to do with cities, and the ideal city is organised around citizenship — around participation in public life." The role of the engineer is not only to create an exceptional space but to foster a place that has personality and flavour.

Advising on the future

If we **wear the capes** in this superhero saga, shouldn't we do more than just serve up what the client ordered? Surely, we should be using our powers to show the way? With insight into the project's long-term impact, who better **to advise and negotiate for the end user**, owner, and community than the engineer?

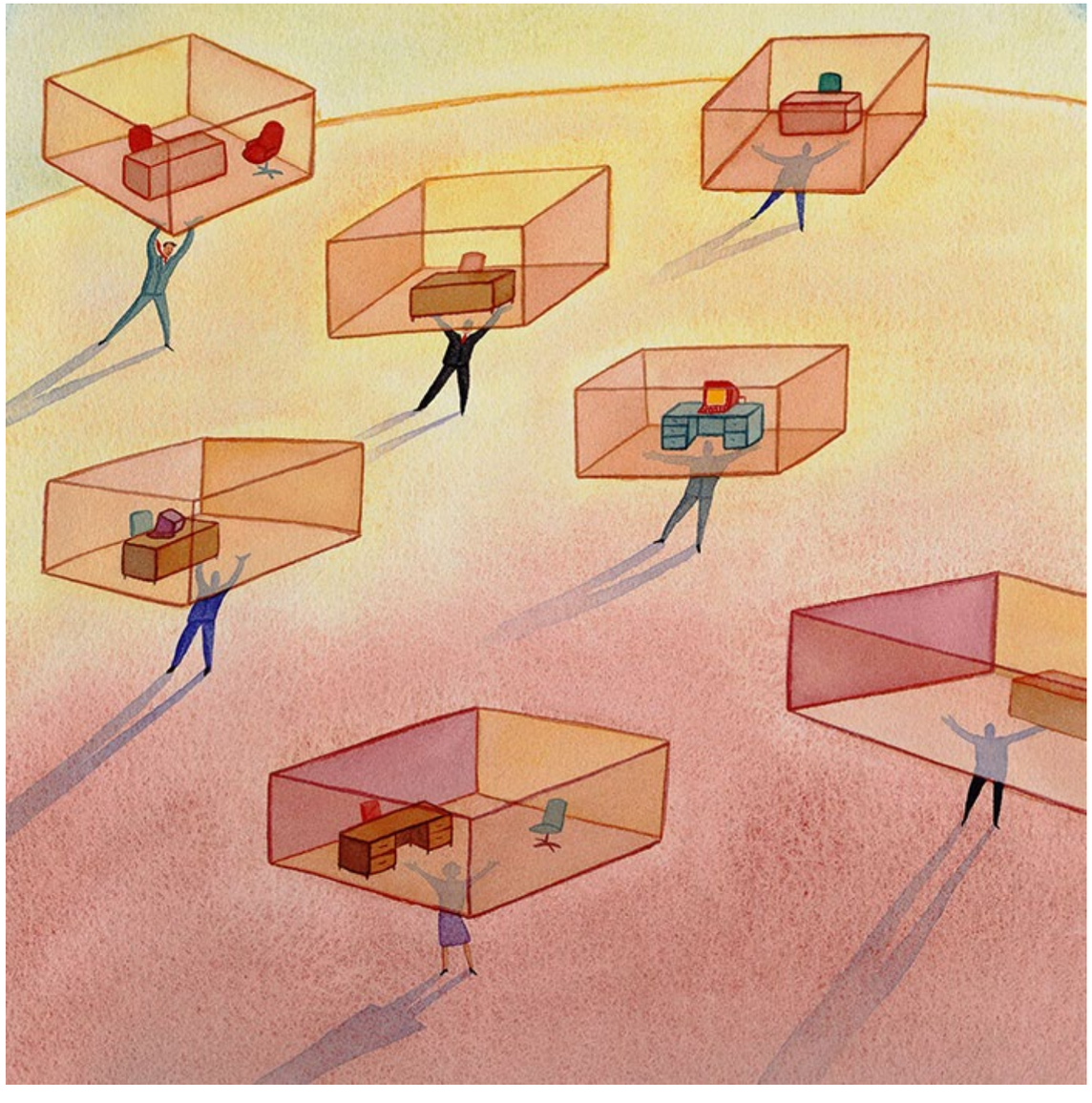
Understanding the clockwork of a city is understanding what makes it tick and come to life. And understanding this requires some serious head locking between urbanists, scientists, economists, ecologists, architects and engineers. Through this kind of tight collaboration, we can pick up the city's peculiar heartbeat and make sure that each of our investments together make the city become a better version of itself.

Engineering is both prophetic and proactive. We pull down conceptions into reality and modify our physical world with the unimaginable. The privilege and responsibility of it should both thrill and terrify us. That's why it's never enough to cut, copy, paste, repeat our knowledge and experience. After all, as **Abraham Maslow** suggests, if the only tool you have is a hammer, you treat everything as if it were a nail.

Pumping out the same solutions for different problems won't get us there. The onus is on us to stop, study and speak through our designs to the flavour and flow of that particular city pocket. It's definitely a big responsibility, but it's an even bigger privilege.

ARE WE THE LAST GENERATION TO NEED AN OFFICE?

Phil Hues



The Internet is the most powerful force behind making traditional work practices and 'the office' less relevant. High speed connectivity and powerful software have the potential to render bus rides, train crushes and coffee queues in order to arrive at the office a thing of the past. Much of this is happening now. Today's workforce could be the generation that pioneer 'bleisure' – a combination of business and leisure which irrevocably blurs the lines between home and work life, and if that happens, then what happens to the office as we currently know it?

A recent **report by Jones Lang LaSalle** showed that within most organisations, staff desks are utilised just 60% of the time, with the other 40% spent in collaboration spaces or out with clients. In this environment people don't even get a desk to call their own and companies are benefiting from needing less office space.

Coupled to this, is the fact that millennials don't want to spend their day in an office if they don't have to. As they seek to balance life style with work style, the office environment may not be the best place to do that.

The 'office' of the future could be your home, your coffee shop, a library or a public park; and might be required to function in multiple ways as a touch down space, a collaboration space, a space where things can be built, a meeting place and more.

As this new model for work emerges, the technology driving this movement forward is becoming more powerful. Technology will soon make it entirely possible to enter the board room for a conference, face to face, with clients and colleagues from around the globe, while you're still at home. Virtual Reality (VR) goggles can readily provide this capability. The time, cost and stress of business travel will be eliminated. Artificial Intelligence (AI) could take care of most mundane tasks that don't require emphatic thought processes. Emails will be **automatically read and filtered**, with only the most important ones being discussed with you.

What's more, your AI device will provide details on each person you meet instantly, informing you of both their personal and professional information. In this world, you'll have the capacity to be more collaborative and innovative than ever before, with the ability to 'see' what those in the physical world are doing and communicate with them whenever you need to, including 'seeing' what is happening on a project site or in your retail outlet and 'popping in' to take care of things without physically being there. You'll print what you need to do your work by downloading a design from the cloud and using a 3D printer to manufacture it.

Within this scenario, innovating will be more important than ever before. If mundane tasks are taken care of, the challenge to all workers will be to find new ways to add additional value. This will place a greater demand on workers to create more value for customers. Intelligence and innovation will become the 'natural resource' that companies must leverage to create competitive advantage. We have seen technology already displace and challenge many blue collar work environments. It would be naïve to think that similar disruption won't occur to white collar work environments, particularly, when millennials are demanding this new balance.

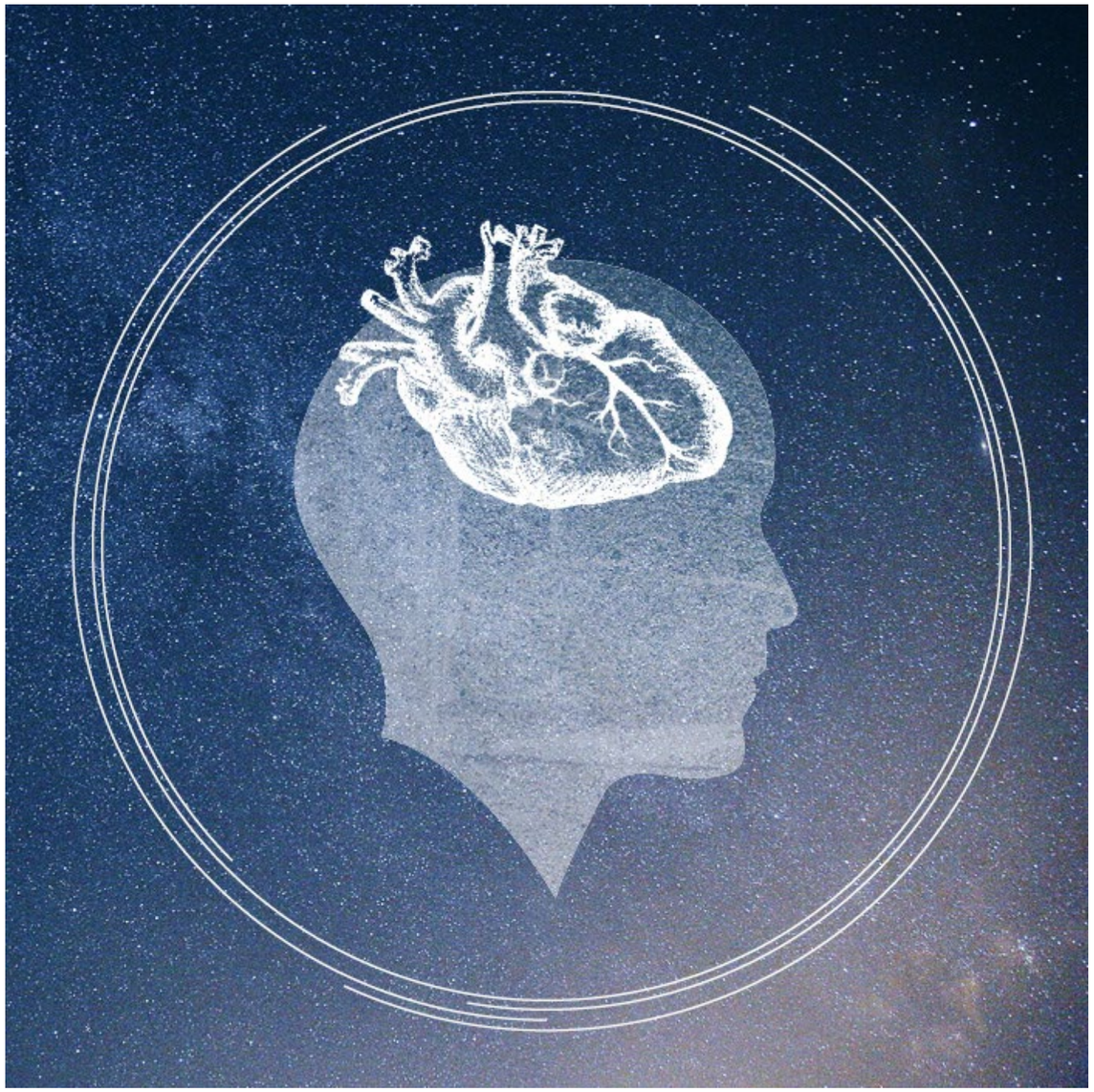
Critically, if we are on the cusp of another workplace revolution, it is important that we contemplate its impact. There is a need for businesses to begin to ponder how the way we work will change; the effects on staff and the need to adjust their resourcing strategies. Uber'isng the office workforce is literally just around the corner.

The first to make these changes and take advantage of an enhanced focus on intelligence and innovation will be the winners in this volatile and competitive environment. **Building owners and tenants of commercial offices**, too, will be amongst a very broad range of stakeholders who will be affected by this revolution – and will need to plan for it.

Very clearly, there's currently no telling where this revolution will end. What is certain is that companies that succeed at anticipating it will enjoy unmeasured success as their teams are encouraged to reach their potential, and as idea generation and better thinking explodes across their organisation.

WORKPLACE LEADERSHIP: NO MEANING, NO WORK...

Georgina Mahony



Our leadership approach to 'being an employer' hasn't changed significantly in decades. Managing people in a work environment involves seeking to gain their best efforts, in exchange for reward – but is it time we redefined reward?

As barriers to mobility between projects, companies, countries and industries disappear – a 'job for a decade' let alone a 'job for life' is now a thing of the past. Money may make the world go round, but as a new generation of employees come to the workforce, it is clear that it doesn't always buy happiness. Enlightened organisations are realising that it certainly doesn't buy job satisfaction either for their new experience-hungry workforce.

If an organisation doesn't show their employees they are valued – they'll move on to the next one who does. With employees increasingly working in **project delivery environments**, how do project managers apply the change needed in organisational leadership to project leadership in order to engage and retain their teams?

Within today's rapidly changing business environment, **creative thinking and collaboration** in order to achieve differentiation have taken pride of place. "Companies are focusing on innovation and unique differentiation – and almost exclusively are looking at people, not machines, to provide it," writes **The Digitalist**. In addition to employees becoming critical to an organisation's success, their expectations have changed.

Gen X and the Millennials (born between 1982 and 2004) are at very different points in their careers (with some yet to start theirs!). It is clear that the Millennials' definition of prosperity encompasses far more than just money. Interestingly, many Gen Xers seem to have reached a similar conclusion – as their careers have progressed, they find themselves looking for greater meaning in their roles. This combined workforce craves shared values, ones that take into account the well-being of others, ones that are underpinned by a sense of worth, consideration and 'togetherness'. In short, it turns out that as a workforce, they are starting to 'care'.

For today's project teams, money alone has ceased to engender loyalty as it once could. With so many projects and opportunities, being paid equitably simply isn't enough. Increasingly demanding project delivery environments mean that growth and development opportunities on projects are key; staff want to feel valued, appreciated and do work that has significance.

Sceptics might ask: but what's the cost in terms of project productivity? Will the 'warm and fuzzy' impact on output? The good news is that all evidence points to soft skills translating to commercial success stories. A person who feels appreciated will always do more than is expected – and isn't this the most basic definition of a high performing team? It turns out that truly valuing staff is not just a 'nice to have', but an essential element of successful project delivery.

Project leaders need to move from delivering monologues to engaging in dialogues. Open channels of communication will ensure greater understanding of what matters to the people who work in their team. It takes a confident leader to listen to the project team first without jumping in with direction from on high. This form of respectful project leadership leads to a relationship built upon mutual trust. When staff feel 'heard' and they have jointly shaped their project's vision, they're more likely to stay and do their best work for the project.

Taken a step further, project initiators, including **governments**, financiers and mega corporations, need to think about replacing dictating the brief and then microscopically scrutinising compliance. Successful project outcomes should be more important – allowing informed and intelligent project staff to use their passion and intellect to define the problem, and then co-create the pathway to solving it, may result in a shared commitment to achieving the project's success more than any end of project bonus could instil.

By this yardstick, tomorrow's most successful organisations and projects won't only be highly profitable, but also highly engaged with their teams. By listening to the needs of their workers, they will be able to create a culture that allows employees to succeed and grow. A project and the people who make up the project shouldn't be mutually exclusive – rather, they should form a symbiotic relationship which draws on and feeds off one another, enabling better outcomes for both.

Systems-based management will become meaningless in the future unless we are able to overlay these inflexible systems with ones that take into consideration the human needs of a workforce that is smart enough to know if they are viewed as a cog in a money-making machine. In fact, you can have as many systems in place as you like, but if the people operating within those systems feel unheard, undervalued and unappreciated, you will never get the right results – no matter what any graphs tell you.

In today's project landscape of KPIs and KRAs, the value of keeping your staff happy is immeasurable.

IT'S NOT JUST ANOTHER DAY AT THE OFFICE!

Ben Gibbs

We have news for you: it's not just another day at the office. Sure, businesses have always changed as management theory, materials and technology evolves – but never before has the pace of change been as intense. In the video **'Humans need not apply'**, the narrator (in this case, a clearly robotic voice) proposed that "Horses aren't unemployed now because they got lazy as a species... they are unemployed because they became unemployable! Many bright, perfectly capable humans will find themselves the new horse – unemployable through no fault of their own!"

Driven by technological progress and increasing globalisation, the 'information age' will leave no paradigm unturned as it **radically disrupts our workplaces** and the way we manage them. There's an **urgent need for forward-thinking companies** to challenge age-old paradigms around both job definition ('what' we do); differentiation ('how' we do things) and hierarchy ('who' does the 'what').

Could changing how we view these today, help us compete tomorrow – and avoid (to as great a degree as is possible) the horse's fate? If the price of doing things the same way becomes much higher than the price of change, how can we adapt to win?

Redefinition, not replacement

Automation is a tool which allows us to produce abundance for little effort. While many studies and articles would have us believe that over the next 30 years, a myriad middle class professions will be **outsourced to automation**, a recent **McKinsey article** suggests that "As the automation of physical and knowledge work advances, many jobs will be redefined rather than eliminated – at least in the short term."

According to their research, "Very few occupations will be automated in their entirety in the near or medium term. Rather, certain activities are more likely to be automated, requiring entire business processes to be transformed, and jobs performed by people to be redefined, much like the bank teller's job was redefined with the advent of ATMs."

According to McKinsey, "fewer than 5 per cent of occupations can be entirely automated using current technology. However, about 60 per cent of occupations could have 30 per cent or more of their constituent activities automated."

Rather than assume that automation will primarily affect low-skill, low-wage roles, this suggests that even the highest-paid occupations, including CEO, involve activities that can be automated. As such, there's a need to **think less about automating occupations** and more about 'redefining roles and processes'.

Staying ahead of metal and chip

Directly related to this, is the fact that keeping your game on in future will require an ahistorical amount of **creativity and innovative thinking**. We will need to differentiate that which only man can do from that which automation may absorb. Yet, research suggests that creativity and sensing emotions (that which machines cannot closely replicate, yet) constitutes only 4 per cent of work activities across the US economy. While these figures might be cause for alarm, they are also a call to arms. As automation increases, our focus should be on tasks that utilise creativity and emotion.

Financial advisors, for example, might spend less time analysing clients' financial situations, and more time understanding their needs and explaining creative options. Interior designers could spend less time taking measurements, developing illustrations, and ordering materials, and more time developing innovative design concepts based on clients' desires.

Bidding hierarchy adieu

Critically, new ways of remaining competitive will also need to influence how we manage. As the advent of digital increases competition, the importance of staying connected to the market and customer needs will increase. An article by Harvard Business Review ('**Hierarchy is overrated**') suggests that change requires a level of nimbleness large hierarchies often simply aren't able to provide. It also suggests that flatter structures promote greater levels of innovation.

A case in point? About 20 per cent of the world's websites are run on Automattic's WordPress platform. It's one of the most important internet companies, but only employs a couple of hundred people who all work remotely, with a **highly autonomous flat management structure**. Similarly, Basecamp, who produce software for distributed collaboration, have a structure which looks a lot like Automattic's.

And this success isn't limited to software companies. Manufacturing company Gore is one of the most successful firms in the world. Across its 10 000 employees, it has only three levels of hierarchy: the CEO (elected democratically), a handful of functional heads, and everyone else.

Shying away from a command-and-control structure, **current CEO Terri Kelly says**: "It's far better to rely upon a broad base of individuals and leaders who share a common set of values and feel personal ownership for the overall success of the organisation. These responsible and empowered individuals will serve as much better watchdogs than any single, dominant leader or bureaucratic structure."

Yesterday's workplaces are evolving. Jobs will be at risk not because of replacement, but because leadership and management are oblivious of the need to reshape themselves. The businesses that do not reshape themselves and the role definitions of their employees run the risk of being beaten by the ones that do. In the future, companies who respond, restructure and evolve will be those who succeed.

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DON'T BEAT THE MILLENNIALS – JOIN 'EM!

Simon Kwakkernaat

Millennials. Employers have denounced them as a generation who require constant affirmation in order to get hard work out of them. But what if we have it all wrong? What if the secret to our techno-centric future is unequivocally tied up not so much in our acceptance of Generation Y – aka the Millennials – as our willingness to actually emulate them?

Picture a world without books: a **dystopian future** in which, under the guise of advancement, mankind has unknowingly traded imagination and creativity for technology.

If this picture frightens you, you probably aren't Generation Y – the largest living generation – who would embrace this future in much the same way that it has every curveball thrown at it. Never mind embrace it, their perception would be wholly antithetical: to a millennial a world sans books represents the very epitome of progress.

If we want to progress, to think beyond tomorrow – beyond **disruption** – we have to embrace this mindset. It's crucial to our future – and a must if we're to position ourselves for acceleration.

Who Millennials are – supposedly

Generation Y has been derided as a lazy, entitled lot, as evidenced by their many monikers, including Generación ni-ni (neither studying nor working) in Spain, Generation Maybe in Germany (so overwhelmed by opportunity they fail to commit to anything), ken lao zu in China (for their perceived lack of focus), and the Curling Generation in Sweden (a reference to the sport and in jest of a generation which supposedly has it easy).

What Millennials have achieved

According to the **2014 Duke University/CFO Magazine Global Business Outlook Survey**, 21% of CFOs said Millennials are more **creative and innovative** than other workers – and they work for less. The same survey found that more than 70% of CFOs said one advantage of hiring Millennials was the technology savviness they brought.

Their innovation can be seen across industries. Among Forbes' list of seven new companies started by Millennials is **Snapchat**, which provides a platform for users to share photos and chat through their smart devices. Then there's **Synotrac**, which has pioneered a sensor that detects early biomarkers for infection in the synovial fluid of the knee.

In 2015, Huffington Post published a list of **eight startups which turned Millennials into millionaires**, including makeup subscription company **Ipsy**, news summarisation app Summly – founded in 2011 by the then 16-year-old Nick D'Aloisio – and **Theranos**, a

company specialising in a painless way to draw and test blood and which launched its founder, Elizabeth Holmes, into billionaire status before the age of 30.

You can't beat 'em ...
It's not even about that. An outright dismissal of Millennials would constitute a grave mistake; we're effectively writing off our future in much the same way that every generation – from the Silent Generation (born before 1945), to the Baby Boomers and Generation X – has decried the generation succeeding it.

Stereotypes and preconceptions aside, the hard fact is that, by 2025, Millennials will constitute 75% of the workforce.

... It's time to join 'em
Just as technology has obliterated global communication barriers, we need to break conventional mindsets regarding how we do business.

To do so, we have to consciously engage a Millennial mindset. That entails the ability to think independently, challenge the status quo, push boundaries, create new paths, bring about social change and roll with the punches – all key Millennial traits.

These digital natives filter everything through the lens of technology. It might seem preposterous to older generations – but to Generation Y, technology and social networking isn't optional; it's how they operate and make sense of the world. They're seriously plugged in, not only riding the wave of technology with an almost innate ability, but also orchestrating the advancement of that technology – both through their creation of groundbreaking technologies and their demand for it.

This tech-savvy approach has also made them forecasters of future trends – they think beyond the here and now. As such, they're the key to our future. Not just that: we also need to think tech – to consume it almost as if by osmosis! It's the future calling.

The consequence of living through several world crises is a constantly changing socio-economic landscape; it has rendered Millennials a highly resourceful and entrepreneurial bunch. And it's this resourcefulness and entrepreneurial spirit that has to be woven into the genetic code of our companies to enable a culture of accelerated innovation.

A fast-paced news and communication environment means that we need to also be instantly responsive and adaptable, in the way that Millennials – who've grown up in this environment – instinctively are.

They've also deconstructed the very definition of work: being part of a global network means that the **office walls have been eroded** and work can take place anytime, anyplace. They want to redefine the work paradigm, taking it beyond work-life balance to work-life integration.

For business, that means being willing to **rethink work environments and operations**. We need to be open to a changing work environment, one in which a flat corporate structure is celebrated over a rigid hegemony; **where employees are nurtured** and social responsibility forms the very bedrock of our value system.

We also have to be as willing to learn from Millennials as we are to mentor them. An **exchange of philosophies** and skills which stems from a mutual respect for the other person will produce far better results than competing for sole recognition.

A Millennial movement
Ultimately, if technology is the axis on which the world of business spins, forget disruption. To remain cutting edge, we need to inculcate a spirit of entrepreneurship and a culture of innovation within our workplaces.

To do this, we have to adapt our business environments for a Millennial movement – or risk those very businesses becoming white elephants.

And where would that leave us? Probably clutching our books, unwilling and unable to make sense of a **world transformed by augmented reality**.

IS IT OKAY TO THINK YOU ARE AWESOME?

Louise Adams

The 'obvious' usually isn't. That which friends and colleagues see 'as plain as the nose on your face' can be incredulous to the nose bearer. And without someone sticking a mirror in front of you, how well do you see your nose?

The world of engineering has never been known for holding up mirrors. We prefer to keep a downward gaze and shake our heads in ruthless self-scrutiny, rather than admire our professional sleek contours. As a result, we don't tell our story and the world is poorer for never getting to hear about the value of engineering as a profession. But studies have proven that a robust and radically positive self-image can spawn unprecedented success in one's personal and professional life.

The art of becoming both narrator and audience of your own success story is not so much vanity as it is good common sense. If our perceptions pave the way to our reality, then we need to ask ourselves, what's causing potholes in our own road? The chances are our pitfalls are self-induced – rooted in doubt and reductionism that breeds compliance, smallness and humility at the cost of innovation. Before waiting for others to back us, we need to learn how to first back ourselves. As bestselling author Jon Gordon recommends, the secret to up and onward may just lie in 'talking, more than listening,' to ourselves.

Facing our internal enemies

The subjectivity of our reality can be proven in something as simple as a backpack. Throw in some extra weight on a hiker's shoulders, and suddenly the campsite around the corner becomes a thousand miles off. The distance hasn't changed, but the perception of it has.

Henry Ford said, "Whether you think you can, or you think you can't you're right." Essentially, he pokes at the idea that reality is a complex mental construction of our own making. All too often, rather than seeing ourselves as aiders to a world of limitless possibilities, engineers allow fear and false assumptions to cram our contribution into unimaginative boxes.

The **idea of uncertainty** cripples us, but the possibility of rejection flattens us completely. So, rather than take a chance and pitch that curve ball concept to our superior, we opt to pass the ball onto a more impervious someone who can stomach rejection. The problem is, in doing so, we rob ourselves and others of the unique contribution only the self-confident engineers can create – a world of limitless possibility, a new vision of communities, a more **sustainable and economically viable future**.

We have to recognise the unleashing power of self-confidence in pioneering transformative change. We need unconventional thinkers to dream of and **build the**

cities of tomorrow. But much to Stuart Smalley's chagrin, silencing the inner critic will take more than an affirmation mantra and morning pep talk in the mirror. It will require discipline ongoing inspection into the motives that drive us and the defaults that hijack our developmental journey. It will summon honesty to face the excuses and rationalisations which roadblock our way. And it will take courage to undo and unlearn the bad habits, which currently hold us back.

The power of the mind

Perceptions are powerful. Dr Alia Crum proved this with a milkshake. In her study on the effects of placebo foods, she found that labels can literally get under the skin and alter our processing. Having concocted a big batch of vanilla milkshake, she then redistributed the drink in two labelled batches. Those who consumed the so-called 'high-calorie Indulgent' shake had produced enough gut hormones to halt all hunger and kick-start metabolism. While, on the other hand, the 'low-calorie, Sensishake' consumers were still bellyaching for more. How is that, when technically the same amount of calories were consumed?

Crum proves that in a showdown of mind vs milkshake, the mind wins. The simple perception of calories consumed was enough to rearrange bodily function. The study shows that the intangible topography of our inner world matters. In this case of a creamy shake, our assumptions are measurable. But in most other cases, we lose the paper trail that links our mindsets to their tangible outworkings in our character and careers. We have to work, live and play in such a way that what we think and believe is the most important thing about us. When we start there, we'll become whom we want ourselves and others to be.

At some point, every company was a 'start-up' with an audacious vision. And while road blocks and problems are inevitable, and, most likely self-doubt, if entrepreneurs don't or can't push through them, the likes of Google or Facebook or Apple or any company for that matter would not come into existence.

Society today needs the next generation of things to be created. We need (as engineers) to find the self-confidence to dream big and find the pathways to future visions we have created. We need to be able to get others to buy into that vision and have the ability to engage them in the story of our future, to attract the investors and the policy makers. We need to believe in the future of ourselves before we can get someone else to believe. Before you can do that, you have to believe in yourself.

Falling forward

Learning to tout your own 'awesomeness' is not an exercise in self-denial. It does not equate to a pile of weaknesses and failed track records under the rug or a prescription of self-medicating mantras for your bruised ego. The discipline of growing in self-confidence, on the other hand, is about welcoming failure and sitting comfortably with weakness. This ability to perceive sinking ships as stepping stones comes from what Dr Carol Dweck has termed the "growth mindset".

In this way of thinking, intelligence can be developed; mindsets are malleable; and nothing is undoable. Learning is the highest virtue in a growth mindset – not performance – and so challenges are perceived as opportunities; criticism is a honing tool; and the unknown is thrilling. As opposed to a fixed mindset that sees others' success as threatening, a growth mindset embraces others' achievements as inspiration and springboards for synergistic success.

Failure is not debilitating, but empowering, as it spares us from believing we're somehow special and immune to hard work. Recognising our innate talents goes hand in hand with owning our innate shortcomings. The key, therefore, is to see falling as a forward momentum.

> AS CHESS PRODIGY, JOSH WAITZKIN, SAID: "THE MOMENT WE BELIEVE THAT SUCCESS IS DETERMINED BY AN INGRAINED LEVEL OF ABILITY, WE WILL BE BRITTLE IN THE FACE OF ADVERSITY."

If we are to sidle up to our civic responsibility as engineers, we have to take our self-limitations head on. CS Lewis defined true humility as "not thinking less of yourself" but "thinking of yourself less." Believing in ourselves is not so much a call to self-centredness, as it is bravely owning our lines in the story.

MIND THE GAP: IS PASSION THE MISSING INGREDIENT IN TODAY'S WORKFORCE?

Scott Tatom

Unengaged. Unmotivated. Uninspired. Do these three words describe your workforce? Research suggests that 87 per cent of America's workforce fails to reach its full potential. Why? It's simple – they lack passion for their work.

Studies are suggesting most of the business world does not take passion seriously enough. And yet, were it not for passion, Thomas Edison may have quit at experiment #8999 – one exercise short of the invention that went on to change the course of human history. Colonel Sanders would have thrown his secret chicken recipe in the dustbin after his 1009th attempt to sell it. Walt Disney would have believed he "lacked imagination" and never gone on to show dreams really can come true (with a $30 billion annual bonus attached).

In today's rapidly changing business environment, we need people who are not primarily motivated by the temporary 'bumps' that the 13th check or engagement initiative provide. We need **self-motivated workers who embrace change** as challenge and commit to **improve their own professional areas** of learning and application. On the shifting landscapes of today's economy, passion may be more than just a catalyst for increased job performance; it may be the anchor as well.

Engagement alone won't do it

Passion is not the same thing as engagement. Engagement assesses employees' **emotional commitment** to the work – are they generally happy for Monday morning to come? Do they see the company mission as their own? Do they feel disrespected when the manager forgets to say thank you? **Gallup** and other internationally renowned surveys prove the obvious benefits of engagement, ranging from higher profitability and customer ratings to lower absenteeism. But engagement alone will not keep the plates indefinitely spinning. Passion, on the other hand, will.

A popular **report** states, "While employee engagement was sufficient in a world of predictability that was designed to optimise scalable efficiency, engagement will be insufficient in a world of unpredictability, constant change, and disruption." The future corner advantage goes to businesses that **invest in risk takers and self-driven learners** who expand beyond their job descriptions, often to **rewrite the job entirely**. Their commitment to excel builds resilience, so that when disruption knocks on a company's door, its workforce is already well acquainted.

Engaged but dispassionate employees thrive on predictable profit margins and 'free pizza Fridays'. Passionate employees, on the other hand, can let the pepperoni go cold. They're too busy being 'engaged'.

Laying new platforms for passion to thrive

Sadly, 87% of America's workforce is falling short of its potential because these workers lack the passion to pioneer and innovate. And companies are certainly not making it any easier, with CEOs and top managers incentivised to manage shareholders' expectation more than run the actual company and **invest in their own people** (an idea former General Electric CEO Jack Welsh has incidentally termed 'the dumbest idea in the world'.)

So how can organisations reshape and rethink their environments to secure the talent they so desperately need? Firstly, they need to redefine whom they're looking for. While trends and innovations come and go, the one indispensable attribute of the work world is disposition. Against the backdrop of vastly depreciating technologies, human talent thankfully stays appreciative.

Moving away from CV superficialities to questions like: 'What world crisis keeps you up at night?' in the interview process can filter out the passionate. Broadening hiring criteria to include a **passion for art**, as an example, encourages cultures of integrated engineering and design. In addition to recruitment, organisations need to learn how to tap and amplify passion from within their ranks. Business leaders need to ask the hard questions like: Does the organisational culture punish or reward failure? Do current systems foster or hinder collaboration? Is it lip service or actual opportunities that employees are given to impact their domain? As companies make the adjustments to foster fresh passion and motivation, they will redefine their workforce and lock down solid sustained performance in increasingly tumultuous times.

Tony Robbins says, "It's not the lack of resources, it's your lack of resourcefulness that stops you." Passion is an unstoppable force that tips problems over to solutions. It operates on the assumption that challenge is the breeding ground for betterment and failure makes you stronger. And when the resources are not there, it will simply redefine the resources and carry on. Unlike the economy of immediate gratification in which we operate, passion cannot be franchised or fast-tracked. It's bred over time in failure and grit and daily grind. And the companies who do more than tip their hat to it will reap the rewards in time.

HAPPINESS DOESN'T COME CHEAP, BUT IT PAYS UP

Vicky Webb

In many ways, there's no such thing as 'just a job'. What we do within our 9-to-5 work week is powerful. Work defines and shapes us; it takes the form of our personal fingerprint on society. And considering that the average person will give 100 000 hours to working over a lifetime, our jobs are anything but a sideline gig in the greater narrative of life. Our work is deeply personal, grafted into the mesh of our unique human design.

In spite of this, when it comes to measuring **organisational success**, we're quick to draw lines and dehumanise the discussion. Profit margins and first mover advantage drive the language of performance that pervades our corporate conversations. Utilisation and expediency are what turn company heads and steer strategic leadership. And though aiming to win is a natural and healthy by-product of business, the danger lies in our diagnostics. Should we fail to perform a full-bodied assessment of our organisations and take the temperature of our people along the way, we may be sustaining a pandemic known as short-termism.

Studies have repeatedly shown that a **highly engaged workforce** means the difference between a company that outperforms its competitors and one that fails to reach its potential. Engagement activates, and there is much evidence to prove it. But little research has been done on what makes staff really happy until now.

Australia's Curtin University, in collaboration with Making Work Absolutely Human (mwah.), has conducted a nationwide **research** that asks the questions: What makes someone want to get up and give it their all, day after day? What kind of organisational culture fosters happy people with a deep sense of purpose and personal fulfilment? As we may have expected, they found money isn't everything. Interestingly enough though, when money isn't everything, it just happens to multiply anyway.

What matters most

"Choose a job you love, and you will never have to work a day in your life." We've all heard this before, and for those privileged enough to relate, it's a statement that **mwah. research** has discovered to be all too true in Australia. Findings reveal that while salary, job security and hours of work count, **it's the job itself that matters most**. People want to fundamentally believe in what they do whether it is tinning top quality tomatoes or driving social activism. Of almost equal importance is the culture in which you work and the people with whom you do it.

These imperatives echo the **theory of self-determination**, which argues that competence (growth and mastery), autonomy (independence) and a sense of relatedness (working together) need to be in place, should organisations want to nurture healthy environments filled with self-motivated, happy employees. When these three basic elements thrive in a workplace, companies will benefit by way of worker retention, productivity and people who passionately love what they do.

Take, for example, the critical element of autonomy. When employees are entrusted to oversee a task, unencumbered by over-scrutinous and bureaucratic roadblocks, they have **proven to perform better and last longer** on the job. They are more apt to innovate and **offer fresh, creative solutions** to historical problems, because they are unhindered by politics and conventionality. Autonomy brings out the best in people, enabling them to inculcate the skills and rich experience of life outside of work into the job itself. Rather than 'leaving your life in the lobby', day to day knowledge can be infused into critical aspects of work and tip 'good ideas on paper' into 'better ideas in practice'.

Money still won't buy happiness

'Happiness', however, has a back story. Companies, even countries, who rank high on the happy factor are the result of meticulous investment and careful planning. So strong is the link between happiness and social wellbeing that the UN has reworked its quantifiable diagnostics of social progress and success to set the state of mind front and centre of the analysis.

For too long, the world has upheld Gross National Product (GNP) as the primary measurement of prosperity, said UN secretary general, Ban Ki Moon, in 2012. Designating a day for its pre-eminence as a "goal of public policy", the UN backed the launch of **International Happiness Day** with the first of its kind, **2013 World Happiness Report**. Drawing the distinction between happiness as an emotion and happiness in the sense of life satisfaction, the report was able to put flesh on the bones of a historically esoteric body of thought.

So too has Harvard economist, Michael Porter, who's currently putting chart-topping Iceland to the test with the launch of what he calls his "**Social Progress Index**" – a new scale for measuring how well societies are functioning. Essentially he argues that, no matter how well a society provides for its citizens' basic needs, they will never be satisfied if opportunity to innovate and improve upon their lives is lacking. Says Porter, "The idea has been that social progress happens if we can improve economic progress. If we increase GDP per capita… life gets better." "That's true," he said, "but it's not enough." A successful society fosters freedoms and equality and springboards to launch generations higher.

Happiness is a business imperative

If health, wealth and happiness on a societal level seem to suggest some common features, shouldn't we apply this litmus of scale to our own corporate cultures? As Curtin University research has found, organisations that apply **high amounts of trust** and employee independence reap better rewards, both in profits and company

morale. Companies that unlock passion unlock performance; they ignite innovation and stir up nonlinear thinking, which tips companies into cutting edge creativity and higher levels of productivity.

Opportunities to grow and gain new skills, to interact across fields of expertise and levels of management, promote employee whole-heartedness and self-motivation. The more an organisation understands what is important to a person, the greater sense of meaning and fulfilment that person feels on the job, and the broader impact that individual can have on the organisation as a whole. When organisational culture adopts a language and posture that prioritises the employee's experience and promotability, companies will inevitably benefit.

As the saying goes, "The happiest people don't have the best of everything; they just make the best of everything". Imagine what we could pull off, if the touchpoints of autonomy, competency and collaboration were named and carefully placed within our HR processes. If happiness was more than lip service and integral to our corporate agenda, we would probably end up accidentally stumbling over profit. Now there's something to smile about.

HOW TO TRAIN YOUR DRAGON

Owen Fair

When was the last time you were really taken by surprise? It happened in a rather humdrum construction meeting the other day, when a lawyer walked into the room. There was a tricky problem thrown down on the table; all thirty construction personnel were either nodding off or furling their brows at it not a creative dragon among them. The client wanted to reduce the time it took to install a monster pump, and no one seemed to have the solution.

Then from the sideline: "why don't you just build an accurate mock-up and have one last weld instead of two?"

The silence in the room indicated a bomb had just exploded. Who would have expected the answer to come from the one in the designer suit, who doesn't own a toolbox? But in fact, it was the only possible solution there was, and it seemed to have taken an untrained eye to not see the obvious limitations.

In today's corporate world, you need sharp elbows and quick instincts to stay onboard the innovation bandwagon. Creativity is now elemental in the race to stay on top. So, why is it that (all too often, it seems) we need a complete outsider in the room to help us see our way out of the rabbit hole? Surely, if innovation is the new bread and butter, we should be laying the table to serve it up?

The problem is that, in an effort to transform, companies are still concentrating on the wrong things to get there. 'Beer and pizza hackathon weekends' aren't enough to turn our work cultures into **innovative beehives**, if our people themselves are not innovating between Mondays and Fridays. After all, it is people not companies who bring transformative ideas to life.

We need to foster spaces and conversations that move beyond the jargon and the generic, and tap into the uniquely creative thought processes of the individual. Science and experience tell us that humanity is hardwired to harbour a creative dragon within. Our job is to find it, and to wake it up.

A case for creativity

We're sure you've heard it said many times before, that so-and-so is 'oh so left-brained'. The idea is a rather nifty, convenient one, where personality traits and cognitive defaults are thought to be cultivated on one side of the brain. Those known as left-brainers are logical, analytical, focused, sticklers for details, while the right-brainers are creative, intuitive, saving the world one hug at a time.

There's one slight problem with the theory though.

It's not true!

In the past decade, **studies** have proven that the human brain is not nearly as dichotomous as the **theory of lateralisation** suggests. Instead, the two lobes need to collaborate to pull off most tasks, using the corpus callosum as the common bridge for communication. Although some degree of hemispheric differentiation exists, the lines between left and right should not be cast in stone.

Quite simply, the brain is a bit more complex than that. Our own genetic composition is bent towards creativity and originality, and even the so-called 'left brained' of the bunch must fluidly interweave ingenuity into cognitive processes that appear void of imagination. To label yourself as 'analytical but not innovative' or 'intuitive but not rational' just cements ceilings in time. You'll innovate to the degree that you believe you are and you can.

Getting creatively fit

Therefore, if our own anatomy is built to create, we have to step off our mental hamster wheels and see what we're actually made of. Creativity is like a muscle; the more we exercise it, the stronger it gets. The more weights we add to our creativity barbell, the more brag we can add to our locker room bench press talk.

The hardest part of a morning jog on a blustery wintery morning is getting out the door. But the reward of returning home with fresh blood pumping through your veins is worth it. Similarly, it is when you dip your toe into the creative pool of your brain the effort to start is daunting but the payback is invigorating.

Waking the creative dragon

So, what's the takeaway for companies who need to hold the line between ideation and profitability? Industries are heavily laden with hard issues and solid figures, and it's all too easy to churn the wheel and speak the language of turnover and market share. But ironically, it's the degree to which we can break out and see beyond the box that determines how long we'll speak the language.

If organisations want to out-innovate the innovators, they have to free their people of corporate dogma and ask the questions, what about this idea? where's the opportunity here?All the **hackathons and design jams** in the world will only do so much. The elixir to ongoing new ideas in a world where everyone is trying to find them is to get your people to **discover their inner awesomeness**. Getting them to unleash the potential they never thought that they had will mark the difference between the future hard-hitters and the one-hit wonders.

Ideas don't happen in a vacuum. They need some inception. They need organisations that foster spaces where questions are imperative, risks are welcomed and mistakes are empowering. Organisations need to serve up the 'grit' if they want to make the pearl. That takes more than a few codathons or hacking competitions; it takes an 'all-in' commitment to activating their people. Just imagine if it was you not the lawyer who came up with that killer idea that day. It could be, the more we start allowing our creative dragons to have a voice at the table.

WHY BEING 'SELFISH' IS THE SELFLESS THING TO DO...

Cass Kenworthy

When the world's richest man sidles up to divulge a little secret of the trade, best you lean in and listen hard. Warren Buffett reckons it's the king investment, impervious to the rising tides of taxation and inflation; the one "you can't beat" that will offer an evergreen return on your investment. In short, that investment is you.

"Nobody can take away what you've got in yourself, and everybody has potential they haven't used yet," said Buffett in recent interview with **Forbes**.

It goes against the pre-millennial grain - the idea of prioritising you, sometimes at the expense of that next email or Saturday morning work call. Somehow the image of the burnt out workaholic, buoyed up by martyrdom and endless cups of coffee, is a noble and better one. We believe our time, money and resources should be spent on someone else. (And almost always, that 'someone else' is not our families.) Technically, we know it's neither sustainable nor satisfying to live like this. But in actuality we're too busy being faithful to the inbox, or the clock, or the boss, to live any other way.

So, what if all this time we spend outsourcing our abilities is not only hindering personal growth, but hamstringing corporate momentum? What if the best thing we could actually do for others is to become more selfish? Buffett and a whole lot of others would say so. Investing in yourself is probably the hardest but the most selfless thing you could do in the long run.

It's all about the grit

Don't get us wrong. There's a difference between self-investment and self-absorption. The latter, argues Simon Sinek in his recent interview with **Inside Quest**, has plagued the millennial workforce who, through no fault of their own, were made to believe they can have what they want, when they want it. With shelves overflowing with participation medals and report cards peppered with undeserved A's, today's young workforce was relentlessly defended and affirmed, irrespective of attitude or performance quality.

But ironically, in spite of all those years of parental ego stroking, **anxiety and depression rates currently rage at unprecedented heights** among this generation. Because, as academic and author **Angela Duckworth has found**, you need something more than self-motivating mantras and untested confidence to succeed in the long run. Studies prove what you need, above all, is grit. Says Duckworth, "Grit is passion and perseverance for very long term goals. Grit is having stamina. Grit is sticking with it, day in and day out, not just for the week, not just for the month, but for years – and working really hard to make that future a reality."

Self-investment requires the same kind of gutsy long term view, where your growth and development is seen as a lifelong marathon and not a sprint; where you're willing to put your personality on the block if it's for the sake of self-improvement. It's a far cry from narcissism, when your weaknesses as much as your strengths, are showcased, gutted and refined for the sake of a better you. No social media platform or helicopter mom can simply give it to you; the sweat equity is in your name alone.

Self is not all about you

Committing to your individual development is usually seen as something...individual; a highly personal journey, with self as both the critic and the canvas on display. But Stanford **research** suggests nothing could be further from the truth. Despite our notions of "self" improvement, the most successful efforts to self-improve have other people at their core. That's because our self-protective egos cloud our judgment and disable our ability to calibrate which talents merit our investment. We actually need the eyes and ears of others to see what we can't see.

HBR recommends that self-improvement stay highly collaborative, with articulated goals and accountability measures in place. "Self-improvement teams" built on honest feedback and invested relationships will heighten the chances of true transformation. "Including others who have a vested interest in your personal change means you increase the odds of your success and, in turn, help them increase the odds of theirs," says HBR. If done well, personal growth is never just personal. It stands to see others grow with you.

It's part of the job!

Taking the time to learn, grow and explore the limits of your professional capacities these days is no longer indulgent; it's a matter of professional life or death. Says Editor of HR Monthly Magazine (Australia), Amanda Woodward: "It will be important to have a portfolio of skills, and investing in ourselves and our development will be crucial to being employed and living the lives we want. Keeping pace with changing technology will be crucial to this but so will the soft skills that robots can't do: these will be increasingly sought after."

Diversifying your portfolio will be essential. And with automation overhauling business as usual, your own personhood will be as vital, if not more important, than the skills you have to offer. Passion will no longer be a luxury, but a crucial commodity to differentiate your good idea from the other million queuing at the gate. In fact, **Gallup research** has found factors like 'purpose' and 'well-being' to act as critical drivers to corporate success, with employee engagement rising from 7% to 55%, and creativity and innovation rising from 20% to 72%.

By taking the time to examine and nurture your passions and dormant discourse, we all stand to benefit. And it could just be the unexpected lifeline to your career that you someday never thought you would need. But work aside, the satisfaction you stand to gain from 'wasting time' on yourself may prove the finest investment yet. As philosopher Wayne Walter Dyer reminded us, "You don't need to be better than anyone else; you just need to be better than you used to be."

WANT TO WIN? FORGET YOUR PRODUCT AND FOCUS ON YOUR PEOPLE!

Liam Hayes

Too often, our preparations for the future centre on how disruption will influence our services. One-step-ahead technologies and systems are a powerful part of a future-ready toolkit, but failing to acknowledge the pivotal role of our workforce within this new future presents imminent danger, because it's not just our products that are changing. **The traditional employee, too, is changing**.

Digital change has given rise to a whole new brand of skills and **leadership styles** that foster agile, technologically sophisticated and **collaborative cultures**. Should we fail to invest in these new talent pools, it may not only be our services and products that will be derailed by disruption; it will also be the people who deliver them.

Employees at the centre

In the Baby Boom era, corporate cultures had two kings. Leadership assumed the role of 'capital K', while the customer enjoyed the 'small k' benefits that ranged somewhere on the spectrum between lip service and reality. And as for the employees – they were just lucky to have a job.

Now, with millennials comprising 50% of the workforce in 2020, the stakes have changed. Their affinity and intuition with complex technology has built an unstoppable self-confidence and business savvy. They firmly believe they can change the world, and they expect their employers to help them change it. Should the company grow creatively stagnant or fail to invest in their journey toward self-actualisation, they are happy to move on.

To win the talent war, digitally evolving companies will not only have to recruit good talent; they will have to find ways to retain it. That's why San Francisco-based **Salesforce.com Inc.** encourages employees to raise their hands when they want a new challenge. The cloud-computing company also offers online courses for their relevant skills and products that, when completed, indicate a person's expertise on their online collaboration site. Startups like **Allied Talent** take employees on a two to four year 'tour of duty' that identifies their personal career goals and marries them to corporate mission.

A whole new toolbox

Truly transformative technology is proliferating at a dizzying speed. Digital disruption's pull away has left deep chasms in workforce skills into which befuddled leaders gaze, wondering when the hole will ever bottom out or when will the cycle change and the old ways return. Well, news flash, when the rules change in the world of workforce expectations, they never go back. The solution to closing the rift is not to add more players, but to **redefine the game strategy**. New skills are needed to stay on top and manage mega change in smarter, more effective ways.

An **Accenture Strategy 2015 study** found that, most important to future recruitment, are the 'soft skills' that marry digital processes to birth innovation. Attributes such as adaptability, playing in team, curiosity and an appetite for risk build robust and adaptable workforces that can weather the storm of constant change. Leadership is no longer valued by the ability to stake in flags and hold the line, but to pull up camp and steer companies through change. Leaders are expected to lead by example and live out the core values which undergird today's business models.

The San Francisco-based software company, **Slack Technologies Inc.**, for example, has its product managers working in customer support to field complaints first-hand, under the banner of "everyone does support". The idea is not only to build real-time product knowledge, but empathy as an integral component of digitally resilient cultures.

But high EQ's and moral codes alone will not close the talent gap. **Tomorrow's workplaces** also require a digital acumen and technological mastery that can harness these interpersonal skills for disproportionate gain. With collaboration as the essential modus operandi for future business, **workers need to know how to use digital platforms** and tools to breed these diverse pockets of synergism.

Virtual networks are the new boardrooms to foster two-way dialogue, thought leadership and consensus building, and employees need to know how to use them to generate collective action. Even as the shadow of **AI replacement** looms over employees' shoulders, workers need to keep investing in digital. Moreover, employees (and particularly leaders) need to keep reinventing themselves and redesigning their roles in the face of digital change. The workers who can't do this risk being left standing in the digital race that replicates **Usain Bolt** swiftness. After all, it will take at least as much technical expertise as humility to share your lunch hour with a robot.

Flattening the cubicles

Traditionally, the word 'team' was associated with a sense of place, where shoulders rub and office space is shared. But the rise of the digital age has reimagined what it means to work in team – and where you work has very little to do with it anymore.

A fundamental shift in business models has taken place; digital platforms have given way to flourishing **online communities** that align to create shared value without the need for intermediary resources or support structures. New technologies, such as 10EQS and Work

Market, have opened the perimeters of engagement, with companies now using a mix of 'own' and 'rented' mobile talent. The classic enterprise is no longer needed to mobilise employees.

Several companies are choosing to see the lemonade in this bag of lemons. They are turning from vertical department structures to building horizontal teams that span geographies and specialisations. Visa, for example, flattened its business model so that formerly isolated teams virtually work together on a project-to-project basis. So, when marketing teams now collaborate with product development and operations, the result is what Visa Marketing Chief, Lara Balazs, describes as "horizontally connected teams [that] drive speed, agility, and nimbleness."

In a highly tumultuous, fast-paced digital world, change is the new normal. Markets are innovating at lightning speed and competitive edges keep blunting. But perhaps what we fundamentally need to secure our future has been sitting on our conscience, speaking to us all along.

'People before product'.

Maybe the key to navigating the new is in ushering in the old.

CHOOSING PEOPLE OVER PROCESS – TOMORROW'S TAKE ON PERFORMANCE

Jeanette Sanderson

It's Friday night. The city's finest restaurant is bathed in candlelight, while a couple clinks to ten years and sips on overpriced champagne. This evening was long awaited; the prospect of some adult conversation was worth the logistical gymnastics required to get the kids babysat. One partner looks into the other's eyes, lingers lovingly over the pregnant pause and then launches the opening statement as planned: "Honey, thanks for joining me for your annual performance review. I've been looking forward to examining how you've gone over the past 12 months."

For the next two hours they dissect and label productivity in graphs and numbers. One partner went from a 4 to a 5 in delegation, but...then again...that bout of toast burning in the month of March knocked domesticity down to a 3. All in all, however, the score was sufficient; the meeting productive; and the dessert delicious.

Sound sexy? We don't think so either. It lacks a certain...heart, don't you think? And yet, when we're honest about the way most organisations handle their people, it's really no different to this. It just lacks the decadent dessert at the end.

The reality is, most of us enjoy our annual performance reviews as much as we do a root canal. With the exception of those rare (and rather odd) eager beavers in any organisation, we usually don't look for opportunities to be pried open and dug into on the operating chair. It's awkward; ambiguous at times, and can be very painful. Unsurprisingly, companies are starting to question the value of the annual performance review, exploring a more natural alternative for keeping fingers on company pulses.

As we've been examining their new normal, we're getting more convinced than ever – that they're onto something. Here's why...

From annual to everyday

The annual review has been called a rite of "**corporate kabuki**" when it comes to offering honest, constructive and real time input. Once a year, the manager sits down to discuss the should've, could've, would'ves of your performance that year, but by the time six months prior is behind you, it's too late to learn and grow from it. The moment has already passed – and rather than it being used as a real time lesson to springboard change and innovation, it now feels like a lingering slap on the wrist.

It's a constant case of rear view mirror gazing, when we should in fact be looking forward and focused on getting future ready.

The point is this: if our organisations are meant to be organic, shouldn't they be breathing? Since we're dealing with human beings, after all, shouldn't our systems operate along the natural rhythms of human relationships and interactions? Isn't this all really about connecting with colleagues and working together to deliver great outcomes for clients and our businesses?

Adobe came to this conclusion in 2012 when they switched to a more agile system that made honest feedback a regular part of the workday. Managers and employees now start the year by co-setting mutual goals and articulating expectations. From there, assessments are real time and ongoing. Constructive criticism or recognition is shared immediately, so that both parties can respond and adapt to what's needed, and at the end of the quarter, workers receive an overall recap of strengths and opportunities for development. It's far more intuitive, in the moment, and it's proving very effective.

From numbers to conversations

What could be dealt with quickly over a cup of coffee has become an ode to endless paperwork and obscure evaluation criteria. And needless to say, the idea of people – complex and emotionally unique beings – being reduced to a number, doesn't exactly fare well.

> "IF YOU'RE TRYING TO MOTIVATE PEOPLE, ASSIGNING THEM RATINGS (ESPECIALLY WHEN FORCED ON A BELL CURVE) ISN'T A GREAT IDEA," SAYS HR CONSULTANT MARY JENKINS IN HER CO-AUTHORED BOOK ABOLISHING PERFORMANCE APPRAISALS.

"Studies have shown over and over again that people simply think they perform better than other people. Unless you rate someone in the highest category, the conversation shifts away from feedback and development to justification." It invariably becomes a martial arts-like exercise of self-defence and justification.

That's why Juniper **did away with the labelling and rating system** and embraced a more human-centred approach amongst their people. 'Conversation Day' is part of the new normal, where employees and their managers discuss the contributions and aspirations of employees for the future – where the concept of passing or failing is irrelevant, and the focus is on possibility rather than pointing out problems.

Steven Rice, Juniper's Executive Vice President for Human Resources says, "There's no label associated with any individual, so from our perspective, there is no formal or traditional performance management process in the company." Juniper made the brave, but somewhat 'messier' decision to respect and engage people, rather than number them.

From measuring to motivating

Research firm CEB found that the average manager spends more than 200 hours a year wading through performance review paperwork. Those hours, along with the costly technology required (and not to mention the wine it takes to get through!), add up to roughly $35 million a year that a company of about 10 000 employees will spend on annual performance reviews. This is just mind boggling!

Imagine if future managers were utterly passionate about the people they work with, where the why would be just as important as the who and what at work. If leaders were to adopt this kind of inclusive, human-centred approach across the board, taking the time to lean in and really understand their people, articles like these wouldn't need to be written. It would be dead obvious: annual reviews would become redundant, and meaningful and purpose driven conversations would be the new order of the day. Sounds brilliant!

But wherever you stand on the issue, it's good to ask if what you're doing now is actually working. Chances are, if your systems are essentially saying, see you in 11 months, you could be doing it much better. After all, keeping your finger on the company pulse means you keep it there every day.

TODAY'S SOFT SKILLS ARE THE HARD SKILLS

Liam Hayes

Every year, Indra Nooyi, the CEO of PepsiCo, sits down to write a letter...in fact, 400 of them. In each one, she tells the parents of her senior executives what their child is doing for the company, and why they are a gift to the company. The response from her colleagues: "This is the best thing that's happened to my parents. And, it's the best thing that's happened to me!"

Needless to say, Nooyi is enjoying a high approval rating in her 11th year as CEO. Why is that? Daniel Goleman's Emotional Intelligence (EI) theory would say it has everything to do with her mastering 'the soft stuff'.

Before this new paradigm infiltrated business schools and boardrooms, strong leadership was top-down, empirical and calculated, emotionally invulnerable. Bedside manners and empathy were optional at best. But increasingly business is waking up to the idea that IQ and Ivy League-splattered résumés won't necessarily translate into running a tight, productive, happy ship. It will take more intuitive, fluid forms of leadership that can leverage the power of human connections and the ability to inspire and envision others. If you want to build anything great, you're going to have to get it the hard way. Soft skills are the hard skills inside the glass walls of today's organisations.

EI: what exactly is it and isn't it?

You only have to listen to Jeff Bezos' quirky, self-deprecating laugh, or reference Mark Zuckerberg's dress-down wardrobe,to agree that today's best leaders are not gunning for super hero status. But their genius (aside from their genius) lies in the fact that they're not trying. Where they've chosen to throw their weight is in their own emotional regulation the ability to recognise and tend to their emotional 'tanks' so that they continue to model something sustainable and replicable to the organisation. More than a sunny disposition or extraverted confidence, EI is about discerning and managing your own emotions, so that you can nurture and develop the relationships around you.

And considering that teams are now far more agile and disparate, the ability to lead a diverse workforce is now indispensable. Vendors, freelancers, offshore teams and contractors sit around the same virtual tables these days, and today's leader must have the empathy, communicative savvy and interpersonal skills to synthesise these contributions into a cohesive healthy brand.

Today, leaders are expected to go first to be transparent and approachable and to model teachability to their workforce. An emotionally intelligent leader turns mistakes into learning opportunities and operates within healthy boundaries of their finite capacity.

Leaders who are emotionally self-regulated and self-aware know how to pause, think and step into another person's shoes before acting. They know how to sniff out the needs of both colleague and customer. Those with high EQs know how to keep growing and learning and redefining their contribution to society, even as the business world is rampantly disrupted. And that's how they keep winning.

EI has a tangible payoff

A TalentSmart study found emotional intelligence to be the number one predictor of performance (among 33 other qualities), with a 58% success rate for a variety of jobs overall. On average, people with a high EQ are $29 000 richer every year than people with a low EQ. Technically speaking, that means for every point you bring your EQ up, you can expect to make a thousand dollars more per year.

Even the US Air Force has punted the genius of emotional intelligence in resilience building. Attributes like assertiveness, empathy, happiness, and emotional self-awareness have become front and centre criteria in their recruitment process. So successful has been a strategy in streamlining the recruiter selection and incentive process that the Air Force has racked up an annual saving of $3 million over the past decade.

The list goes on. Hundreds of case studies highlight the direct link between EI and your bottom line. In fact, Travis Bradberry points out in his best-seller, Emotional Intelligence 2.0, "We haven't yet been able to find a job in which performance and pay aren't tied closely to emotional intelligence."

How can I get more of it?

Unlike IQ which is fixed signed and sealed into your DNA emotional intelligence can grow with time. And what's more, because EI is dynamic and responsive, a person can have an average IQ but outperform a colleague with a high IQ, 70% of the time. So, particularly for us not-quite-Einsteins in the room, how can we leverage the plasticity of emotional intelligence to stay inspired, self-motivated, and relevant in the field?

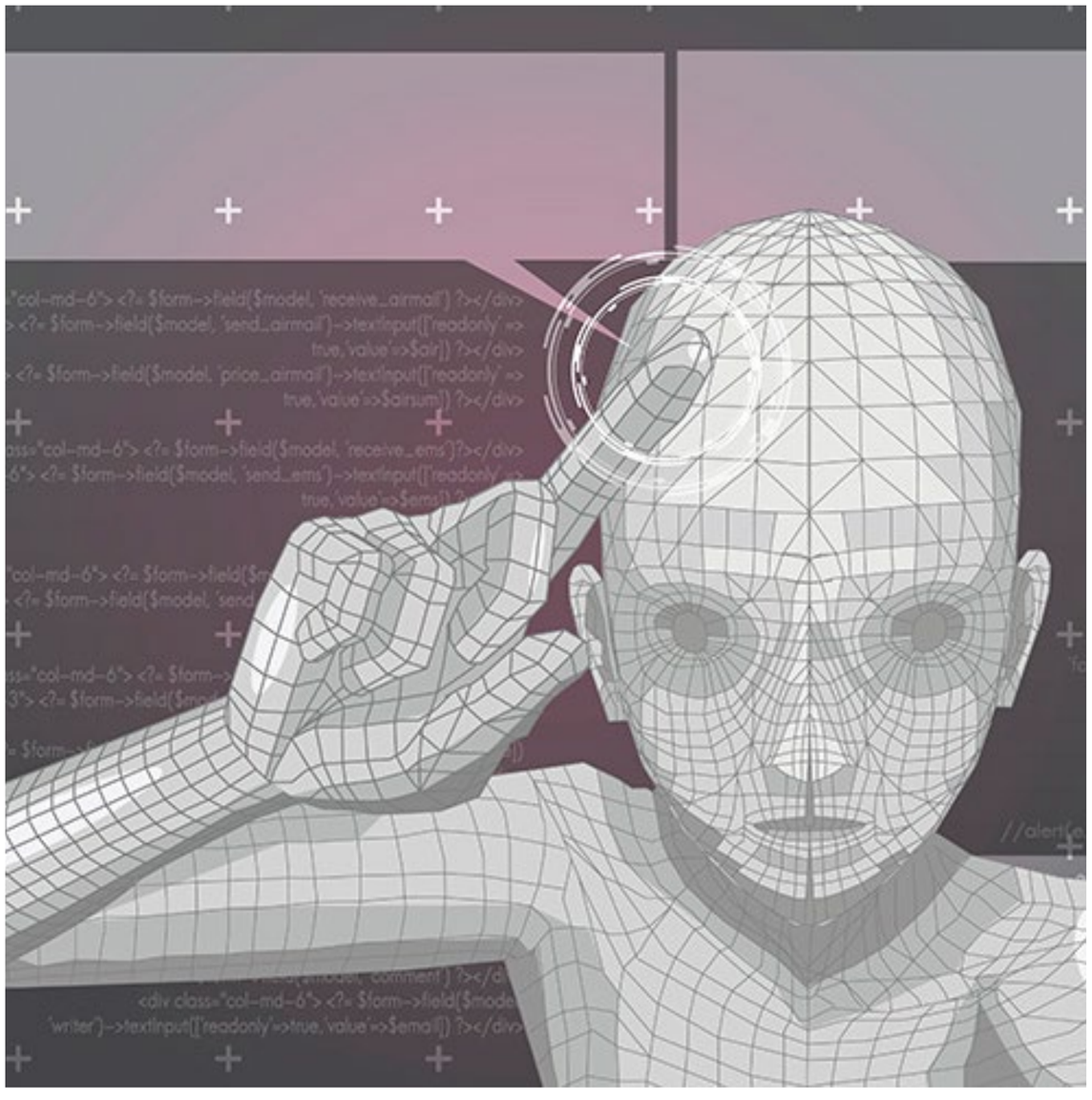
For one thing, we must get better at listening. It's a rare but critical skill in the modern workplace. If leaders can learn how to get others talking and create safe, engaging environments where the smartest one in the room isn't necessarily the highest paid, innovation will automatically pop. If empathy is an articulated goal, and we make it our aim to see the story from someone else's side, we'll sidestep a lot of time-and-energy-guzzling conflict. We'll be able to relate better to our clients and teams. And, if we can get dead honest with our own strengths and weaknesses, we can most probably have the insight to tolerate others' limitations and oversights.

The good thing is it's never too late to grow up. If **the world's richest man can wash the dishes every night**, we need to eat some humble pie when necessary and make the changes to reap a more fulfilling career and personal lifestyle. No leader, no matter how renowned, has it together on all fronts. **Goleman** reiterates this: "EI includes a broad spectrum of competencies, and no leader is A+ across the board — even the best has room to improve."

So, it's worth the asking today, what does your EI inventory look like? Maybe it's time for a stocktake. EQ may not be everything but in the ever-changing world of future business, it's the closest thing to 'everything' we've got.

TOMORROW'S JOBS: THE NEXT ELON MUSK IS STILL IN PRIMARY SCHOOL

Gavin Cotterill



It's a fact – jobs as we know them are changing and many 'tried and true' career paths will cease to exist as we enter the digital age. How do we prepare our children for jobs that don't yet exist; using technology that hasn't yet been invented; for problems that don't exist yet?

The digital age is reshaping industries across the globe. How can we plan a future workforce when we don't yet know what jobs they'll perform? How can we develop talent when we don't know what our businesses will need in a few months from now; not to mention years?

While many parents have traditionally urged their children to pursue the 'safety' of career paths such as 'accountant', 'secretary' and 'teacher', a clear move away from a number of traditional skills and trades will be needed as the **Fourth Industrial Revolution** demands new roles, new skills and will fundamentally alter the way we live, **work** and relate to one another.

In tomorrow's economy, your job title won't be enough to keep you employed. The (successful) children of tomorrow won't be those who can recite the periodic table, but rather the **problem-solvers**; those with the ability to offer an alternative viewpoint to the 'logical' solution, and those who are curious enough to challenge yesterday's solutions. Tomorrow's success will belong to the innovators.

Is Elon Musk an anomaly, or is it possible to instil in today's generation the ingredients of success for a future that is as yet unwritten? The next Elon Musk and Mark Zuckerberg are in primary school right now, they just don't know what their empires will be. If today's generation are to be among the winners in the race for success, they (and their parents) will need to heed some key, counter-intuitive principles:

Being clever simply won't be good enough

Today's generation of digital natives won't only be required to understand data and technology; they'll be required to collaborate and apply it in new and exciting ways. Understanding data and technological principles is one thing; designing machines that can self-learn and robots is quite another.

The employees of tomorrow won't perform the same job over and over again; they'll be expected to think and apply their knowledge. They will need to be taught how to be the interpreters and the translators between the digital world and the real world. Parents and teachers alike would do well to ensure today's children aren't only taught the theory behind how things work, but given the mandate to utilise this theory to evolve and test their own assumptions.

You won't ever 'reach your peak'

Success tomorrow will depend on an insatiable desire to learn about new technologies and to apply them. The children who understand this will go on to be the early adopters of technology, and will push the boundaries of applying it to their advantage. In tomorrow's economy, there won't be room for those who think 'they've arrived' and stalwarts will become 'stale warts' if they don't push themselves and their skills to evolve.

The 'good guys' will always win

In the past, climbing the corporate ladder didn't necessarily take character; and quite often involved a degree of ruthless drive. But the truth is, we're entering a future that will require collaborative behaviours to work in a data-driven world.

Social networks have demonstrated the power of connecting people with open and free forms of communication. The online world and social media means reputations can be built (or destroyed) in seconds. Coupled to this, our concept of community has evolved to include online relationships that allow us to collaborate and share across physical and geographical boundaries. Tomorrow's leaders will understand the power of good relationships, online and otherwise, as well as the power of leveraging these connections.

Preparing our children for jobs that don't yet exist; using technology that hasn't yet been invented isn't as impossible as it sounds. What we must ensure is that we continue to update the principles we teach and embrace the attitudinal requirements of these new roles. This 'toolkit' will stand them in good stead to stand on the shoulders of the Elon Musk's of old.

WHY THE MOHAWK IS GOOD FOR BUSINESS!

Abbie Wright & Matt Aberline

It's Monday morning, and it's time to trade in your Mohawk for a more 'palatable' comb-over. Your latest tattoo (a mandala that inspires you to dream) is neatly tucked away under your crisp white shirt. Ankle bracelet removed, you push your standard-issue beige socks into black loafers. It's time to switch off your inner self and turn on your corporate persona.

Successful businesses are 'innovative' and 'creative'. They 'do things differently', or claim to. The driving force behind this success is a company's employees – those who enter the product incubator daily in order to turn 'innovative' and 'creative' into verbs. Quite often, however, we expect 'out-of-the-box thinking', yet expunge any form of expression. How can we expect staff to reach their full potential, if we won't allow them to bring their authentic selves to the table? Few companies will admit to any form of racial, gender or other forms of bias, but in focusing on compliance – have we lost sight of inclusion?

It's easy to pay lip service to collaboration when those around the proverbial boardroom table all conform to our homogeneous version of what a team member 'should' look like. Changing this will require managers to get comfortable with 'different' in all its shapes and forms – and the acceptance of several key principles:

Authenticity is not only good for people

The corporate world is fraught with categorisation – a sorting of who is good enough to play which role at which level. Companies aren't allowed to (openly) make discrimination a part of that categorisation. But human nature dictates that what we see shapes what we think and what we think, in turn, filters how we see. The alchemy of perception is very difficult to dissolve – making the mistake of assuming that our perceptions reflect the truth even more so. In reality – there is a difference between a Mohawk and a comb-over. It's called authenticity, and in the workplace, a **Journal of Happiness study** has found that the greater an employee's feelings of authenticity, the better their job satisfaction, engagement, and self-reported performance.

Another study, cited by **Harvard Business Review**, involving two hundred and thirteen employees, saw a very clear theme emerge: being allowed the freedom to be authentic improves productivity, increases performance and success, and allows employees to exert less energy and time censoring or hiding themselves. Similarly, employees who spent less time and energy on 'self-monitoring' had more time and energy for focusing on the task at hand.

Authenticity is not only good for people – it's good for business too.

Difference is not division

Sadly, those who are 'out of whack' with what's perceived to be 'corporate' are often seen as disruptive, and often by the very people who are responsible for supporting their careers. **Different shouldn't ever be disrespectful**. It's quite the opposite, actually, as it recognises an important truth: we can be united, yet not the same. That said, the caveat of balancing authenticity with a healthy respect for the people you are doing business with still applies.

The challenge for many organisations is "How do we support managers to lead with difference at the forefront of their minds?" **Diversity Council Australia's research** sheds valuable light on the need for inclusive leadership and what it takes to build more inclusive leaders. Importantly – inclusive leadership isn't built overnight. **Leaders have a responsibility to develop and improve** their inclusive leadership capabilities by honing a mindset that focuses on **diversity and inclusion** while, at the same time, balancing client needs and expectations.

Inclusion not compliance

Today's workplaces are strictly governed by legislation. There are obvious **workplace requirements that need to be fulfilled**, including preventing discrimination and harassment; ensuring flexible work options for all employees and addressing unconscious bias during the recruitment, retention and reward phases. But beyond compliance – most companies don't actively pursue inclusion.

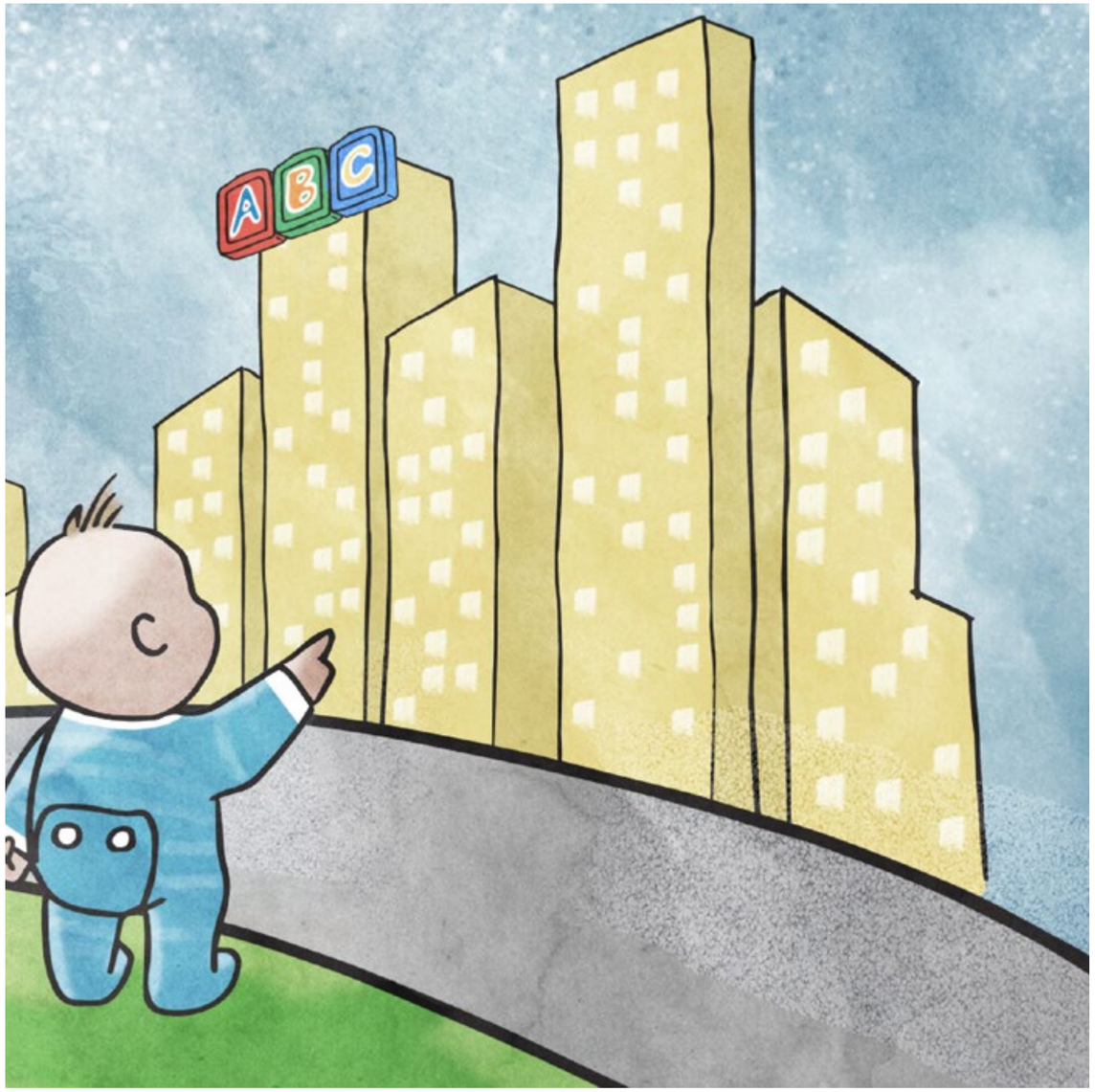
If they did, the Mohawk and the comb-over would work with each other towards a shared purpose – such as creating an exceptional client experience. It would be the outcomes they produce and the value they create for the organisation that would be important, and not how they looked when they were creating them. If they did, people would not need to use unconscious bias as an excuse for not engaging with and supporting each other in the workplace.

If they did, diversity would not be associated with minority groups, but rather be something proudly worn on everyone's lapels. If they did, businesses would get to truly unleash the potential of their employees and reap the benefits of an inclusive workforce. The world we live in is an exquisite potpourri of shapes, sizes, cultures and genders. Why does the workforce not mirror this montage?

The forward thinking companies of tomorrow will be those who see authenticity as an enabler. They'll understand that allowing people to bring their authentic self to the table is what results in the best client experience. They won't only welcome the Mohawk and comb-over… they'll celebrate them!

NO EXPERIENCE? NO PROBLEM! APPLY HERE

Matt Aberline & Jane Moran



We are living in a world where the most powerful people are not necessarily the smartest or the most experienced. Change is happening and it will not wait for you to get used to it. Economies are being disrupted faster than the metamorphic rate of the Google doodle. Innovation is moving quicker than the speed of your UberEATS. In the next ten years, smart software and robots **threaten to replace 30% of the workforce worldwide**, and 60% of what we're training our young people to do will be **irrelevant in 10 years' time**. This begs the question, 'where must we change our game plan so that we don't get moved to the bench?'

The world is no longer 'business as usual', and neither should we be. If just less than one-third of all jobs are soon bound to be overhauled by automation, we need to re-evaluate the skills and qualities imperative to staying one step ahead.

Up until recently, professional experience has been one of, if not the most, critical of attributes in hiring the right person for the job. An employee who was loyal and familiar with the industry could bank on steadily climbing the corporate ladder over time. But today's business climate is a bit messier. If someone thinks they can do it better, they usually can and do. Ladders seem to have given way to scaffolding; the one-way ascent to the top is now a multidirectional pathway, based on vision and ingenuity. The ability to innovate and think creatively are now fundamental to our digital future.

Is it not time to consider that our greatest assets in the way forward are not locked up in professional familiarity, but in those who lack experience? The 'been there, done that' approach will only count against us as we plough ahead. If what worked twenty years ago may be the stuff that sinks us now, should we keep adhering to it? What we really need is unhindered visionaries who are so busy dreaming up the next solution that they don't even realise which historic rules they are breaking.

The trap of 'been there, done that'

A 2015 report by the Boston Consulting Group, Die Another Day: What Leaders Can Do About the Shrinking Life Expectancy of Corporations, studied the life expectancy of 35 000 publicly-listed companies and found that CEOs and investor time horizons face a one-in-three chance of not making it past the next five **years** (compared with a five per cent risk 50 years ago). The question crouching in the corner is 'Why? What went – or sadly will go – wrong?'

Vijay Govindarajan, in his book, **The Other Side of Innovation**, suggests that it's a three-pronged problem. Big companies run by experienced professionals risk falling into one, if not all three traps involving physical, psychological or strategic shortsightedness. Physically, big investments in old systems or equipment block the flow of fresher, more relevant investments. Psychologically, companies become too fixated on what worked in the past to notice new trends and potential displacements. And strategically, companies get so caught up in catering for the market demands here and now that they fail to anticipate the future.

In the boardroom, it is imperative that corporate knowledge (experience) is a capability held by board members, yet is perspective considered less essential? **By 2025, three-quarters of the workforce will be millennials**, but will their perspectives be captured by the boardrooms?

The advantage of ignorance

In these days of tumultuous change, we cannot afford to fall into the traps of what worked even yesterday. Rewind to the year 2000, and surely former Blockbuster CEO John Antioco would say the same if he knew what he knows now. Failing to see the growing market for on-demand and online streaming, he turned down a $50-million offer to buy the now $32.9-billion Netflix, seeing it as "a very small niche business."

On the other hand, Reed Hastings decided, "if you have hitchhiked across Africa with ten bucks in your pocket, starting a business doesn't seem too intimidating." He had "no idea" whether customers would use the service, and his motivation for starting Netflix was partly to sidestep another future $40 overdue Blockbuster fine. Little did he know that today Netflix shares would sit at 9925% above the IPO price.

'Big Company Syndrome' ultimately led to Blockbuster's demise, with the former megastore filing for bankruptcy in 2010. They failed to see new gaps in the market and look for ways to improve their service delivery. Rather, the assumption was **'just keep doing what we do, and it will be fine'**. In this case, tunnel vision drove Blockbuster straight into the wall at a dizzying and destructive speed. A gutsy 'nothing-to-lose but everything-to-gain' vision on the part of Netflix, however, had them soaring.

Jump!

In a leaked internal memo, Nokia's CEO Stephen Elop, tells the tale of man who was working on an oil platform in the North Sea. One night he woke up to the entire platform on fire. Surrounded by flames and standing on the edge, he was faced with a decision: go up in flames or plunge into the cold, foreboding Atlantic waters. He decided to jump.

"WE TOO, ARE STANDING ON A BURNING PLATFORM," SAID ELOP, "AND WE MUST DECIDE HOW WE ARE GOING TO CHANGE OUR BEHAVIOUR."

Elop lamented the company's series of missed opportunity: "While competitors poured flames on our market share, what happened at Nokia? We fell behind, we missed big trends, and we lost time." Essentially, they failed to see the urgency of the times.

In a time of monumental transformation and market redefinition, they require minds that are free from the confines of complacency; they need people who see the gravity of the times and the danger of doing the 'same old'. Tomorrow's big competitors need to be comfortable with crisis; urgency does not necessarily mean emergency. Who better to thrive in these spaces than those who don't come with a default setting to status quo? Merit is as much about potential as it is about past performance.

In a time when change is the only constant, the notion of 'inexperienced' can become a powerful asset to a team. Diversity really does matter; employees who don't need to 'unlearn old habits' really do save time. If the future is to be created by those who forge it, then job loyalty and former paradigm thinking will never get us there alone. After all, "the electric light did not come from the continuous improvement of candles".

IT'S NEVER TOO LATE TO NOT GROW UP

Trevor Sharrock

Ever since our drawings of stick figures were hung up on the fridge at home, we've been telling the world what we want to be when we grow up. Even our dress-up toys (the little plastic stethoscope for a birthday present; fire fighter's hat; the police badge) subtly beg the question: "What will you be when you grow up?" Yet, considering that many children at primary school today will end up in jobs that don't even exist yet, the idea of 'what I want to be when I grow up' is more confusing than ever before.

Let's face it most 15-year-olds don't have a five-year plan. Even Bill Gates didn't aim for '**Harvard dropout**' on his résumé. The pressure of establishing a career comes all too early and demands our asking, is it even a good question at all? Given that we are multifaceted and protean in design, should we even aspire to forging one career path?

Jaime Casap, the Chief Education Evangelist at Google, says: "Don't ask kids what they want to be when they grow up but what problems do they want to solve. This changes the conversation from who do I want to work for, to what do I need to learn to be able to do that."

We need to flip the age-old conversation on its head and speak to character more than career. The Herculean 'job title' is dying. It's now about the type of person we want to bring into our workplaces. The age of the time-honoured and tendered executives is behind us. Today's organisational cultures are looking for that certain 'spark' as much as they are skill. The ones who take the future may just be those foolish enough to believe they can be a dentist and a dancer in a day.

Moving sideways

Gone are the days of 'for better or for worse' between employee and employer. **Today**, one in four workers has been with their current employer for less than a year, and one in two for less than five years. And going forward, a **Jobvite study** has found that 42% of millennials expect to change jobs at least every 1-3 years. The corporate ladder has lost its lacquer; people are pursuing a windier path that is project-based and not locale or company-based.

Today people are on the move, choosing to freelance, work part-time, consult, or come in as a third party. Flexibility and agility are kingpin attributes in a corporate world that has to move at lightning pace; knowledge needs to span specialties and even industries.

The millennial workforce has an insatiable appetite to learn and try new things even if they fail while doing it. With purpose motivating stronger than paycheck, the prospect of employer monogamy can be the great enemy, if the atmosphere of opportunity is stale. We have to make sure our organisations are offering multiple pathways to keep growing our people. 'Up' is not the only direction anymore. **Millennials are looking to go sideways** and even down if it will benefit their professional and personal portfolio.

It's not about the job, it's about the work

Simon Sinek **believes that** somewhere between Gen X and today, the tectonic plates of corporate reality have shifted. Previously the benchmark was job loyalty, stability, financial security. The narrative is now "How do I make an impact?" and even "How do I save the planet?"

The previous generations of 20 years didn't have this view. But then, intergenerational affluence has seen each generation progressively give their kids better. Through each generation, kids get better educated, go on better holidays, and have better experiences. Access to better education and having generally better amenities in life means that they want for less, but also that this 'better life' becomes the new norm for them. When they turn their mind upwards as to 'what they want to do', their starting point is higher and hence their aspiration generally goes higher. 20 years ago, life was about achieving a good stable pay check, but now it's about bigger things like saving the whales or the planet.

What will the new norm in another 20 years be as societal intergenerational affluence continues to grow and each generation of kids experiences a better quality of life? Starting from an even higher benchmark, what will the future generations aspire towards – and how will employers start to build that into their work structures and employment offers?

The questions we should be asking

The digital evolution is creating some deep rabbit holes of opportunities. If we're honest, we don't know where we'll come out on the other side. No longer can we afford to make it just about the job; we need to be looking for people who know how to stay one step ahead of whatever that job may be.

When hiring, we need to be asking questions like: What motivates you? What are your passions? What legacy are you going after, both personally and professionally? What would you be proud to tell your parents or your kids about? Finding the right problem is the meat and potatoes of innovation, and we need to cultivate a culture that attracts the divergent thinkers. The companies that will run ahead are those who know how to apply today's skills while drawing out tomorrow's skills not yet imagined.

Casap reminds us to shoot higher as we reinvent our organisations. The right question is ‘how do we want to change the world?’ rather than ‘what do you want to do for a living?’ Suddenly, ‘‘the conversation changes from ‘which rung on the ladder do I want to reach’, to ‘should I even climb a ladder when a combination of escalator, water slide and a ramp might get the outcomes that matter to me?’’ Our work can be far more generative if we become more authentic through the process. Maybe it’s time to re-pose the question to our 6-year-old selves, who (not what) do I want to be in the future? It’s never too late to not grow up.

APPENDIX

Click the links below to read more articles on Just Imagine in the following categories:

Business

Cities

Digital

Diversity

Engineering

Innovation

Leadership

Sustainability

Workforce

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Our clients' ideas and aspirations drive all that we do. We work alongside them like no other firm to co-create clever, innovative solutions to some of the world's most complex challenges, adding value across the project lifecycle through deep technical and advisory expertise. We serve our clients across a range of markets, in locations worldwide. Hardwired in our DNA are engineering, design and the deep need to leave a legacy. We are as diverse as we are dynamic. As curious as we are clever.

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