core

THE CHANGE MAKERS' MANUAL EDITION SIX | 2018

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FIRST WORD

Professor Andy Lockett
Dean of Warwick Business School

There has been much talk and hyperbole about AI and the fourth industrial revolution that it is easy to become cynical and dismiss it as just that – hype.

But when Douglas Terrier, NASA's Chief Technology Officer, says it is "the most fundamental change in human history" and "will pass human intelligence within decades", as he did in a recent talk at our WBS London base at The Shard, we should all sit up and take notice.

Dr Terrier also argued AI will be pivotal to any business being competitive and it is why we have launched an AI Innovation Network to bring those researching and working on the technology in academia and industry together to learn from each other.

It is not surprising, therefore, that AI forms an undercurrent to the sixth issue of our Core magazine. The fourth industrial revolution – the convergence of AI, machine learning, virtual and augmented reality, 3D printing and the internet of things into still unimagined new products, services and even industries – will affect every sector and profession.

At WBS we have identified six areas of research that transcend the school and are core to all of our activities, both now and in the future – healthcare, behavioural science, finance, strategy, entrepreneurship and innovation, and leadership.

All six areas will be affected by the rapid technological change around us. Our Data Science Lab is combining big data and behavioural science, while Panos Constantinides and Mark Skilton are looking at how AI is being used in healthcare. Finance is undergoing its own technological revolution through open banking and the rise of cryptocurrencies.

Strategists will have to steer their organisations through this revolution as will leaders, while entrepreneurs will be eying the tremendous opportunities these new technologies bring.

Away from business the ramifications for society as a whole are huge.

Bill Gates has warned that AI may dramatically eliminate jobs, including many white collar professions like accountancy and law. While legendary statesman and former US Secretary of State and National Security Advisor Henry Kissinger has called for a Presidential Commission to urgently assess the impact AI will have on a nation still in tumult from Donald Trump's ascendancy.

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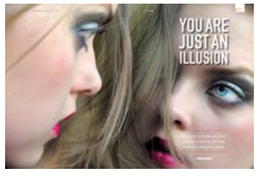
In this issue Maja Korica calls for the introduction of a 'robot tax' as a "redistribution mechanism of corporate gains from automation". She certainly presents a compelling argument and indeed a version of it has already been implemented in South Korea. It is something more governments are looking at, especially as the potential loss of millions jobs over the next two decades will drastically reduce income tax receipts.

Korica also calls on business leaders to consider how they and their organisations can help soften the impact of AI and look at the "broader well-being". That is something business schools should be teaching, especially in the post-crash world, and ethics is certainly at the heart of our programmes as we look to develop socially responsible graduates aiming to change the world for the better.

Our graduates will be shaping and living this brave new world. It is up to us to send them into this revolution with their eyes and minds wide open.

IN THIS ISSUE



CORE Magazine Issue 6

Executive Editor:
Ashley Potter

Cover illustration:
Martin Sun, LightCG Club
光影之间 黑白画谱

Printed by:
imageData group

Published by Warwick Business School,
The University of Warwick, Coventry, CV4 7AL.

Email: enquiries@wbs.ac.uk
Telephone: +44 (0)24 7652 4306
Website: wbs.ac.uk

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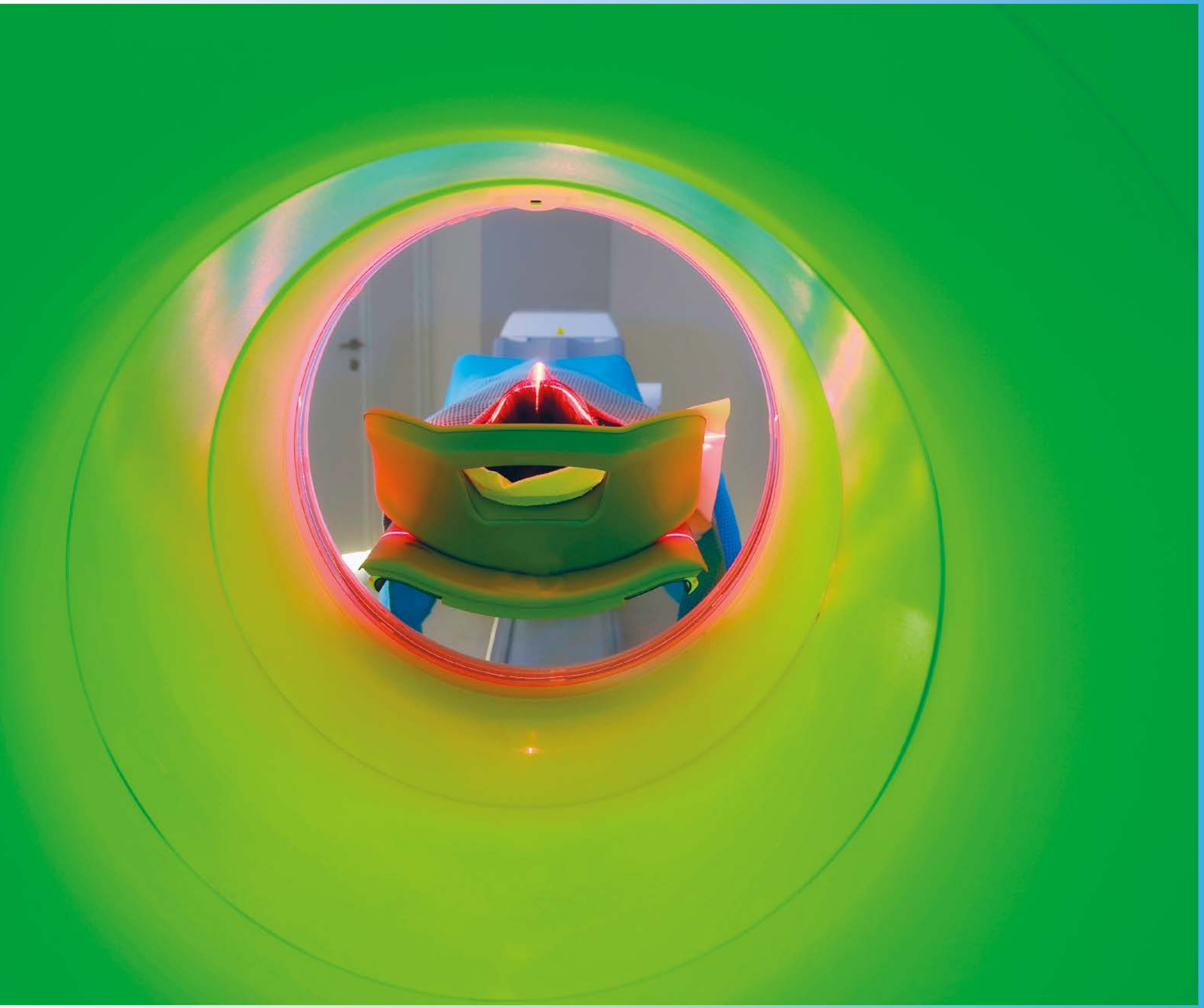
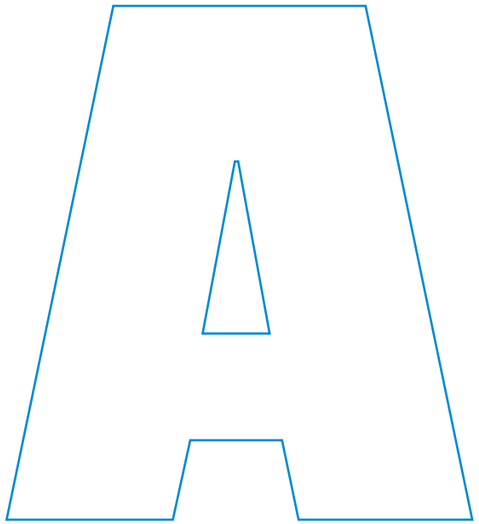


Can AI cure healthcare's ILLs?

The vast sets of digital data held by healthcare organisations are ripe for AI start-ups.

by **Panos Constantinides & Simon Rasalingham**



recent *Lancet* editorial pointed out that, "in the span of their professional lives a radiologist will read more than 10 million images, a dermatologist will analyse 200,000 skin lesions, and a pathologist will review nearly 100,000 specimens".

Advances in deep machine learning and artificial intelligence (AI) mean a lifetime of work can now be done in days, rather than decades – AI takes just 33 milliseconds to scan and diagnose an x-ray.

Such a saving in time will not only free-up clinicians to get on with what they are good at – saving lives and treating patients – it will also save healthcare organisations millions of pounds.

For instance, the UK's National Health Service (NHS) currently outsources the diagnosing of x-rays and images to several companies, who employ hundreds of people to pore over them and send them back, which can take a week or more.

Instead of hundreds, Behold.AI – a deep-learning medical software company in trials with several NHS hospitals – employs four data scientists and diagnoses thousands of images every minute, giving doctors an instant pronouncement. Moreover, if the trials succeed, this can be rapidly scaled across the whole NHS with the addition of only a handful of staff.

And this is just in radiology; AI technology can be applied across so many areas. According to recent data from CB Insights, a venture capital database, the number of start-ups entering the healthcare AI space across the world has increased by 65 per cent from 2012 to 2017.

There are more than 100 companies applying AI algorithms and predictive analytics to improve the time of diagnosis for different medical conditions, reduce drug discovery times, and provide virtual assistance to patients, among other services. Basically anything with an 'ology' and a large set of digital data will have an application for AI and this is something at which the NHS excels.

The NHS may have made unwelcome headlines by wasting at least £10 billion of taxpayers' money when its National Programme for IT was abandoned in 2013, but its digital systems are a lot more connected and centralised today than many imagine or is seen in many other countries.

It has also been set a target by the UK Government to be paperless by 2020. All this gives the NHS a unique advantage.

It is why Behold.AI relocated from New York – where hospitals very much act independently while states have different regulations – to the UK. Plus, through demographics and its funding pressures the NHS also has a critical need for AI.

The NHS' connected system also means more data and the key challenge for AI has always been access to more data, which needs to be trained.

Continuous improvement

AI platforms can only learn how to analyse data if they can understand when they get something right or wrong. The more the AI platform can learn from correct and wrong answers, the better its success rate gets.

This training is a continual process, and is akin to a child learning to read. They will make mistakes, but with education and practice, become better and better.

Yet, even as adults we are still learning new words and making occasional mistakes. That is exactly the same process when training an algorithm, it will be training forever.

This training process is vital. The algorithms for AI in their rawest forms are available publicly through academic papers. The real skill is not in the algorithm but how you take the data and train the system; you have to manipulate the data to find something out of it.

These well-trained algorithms will not only create efficiencies and save the NHS money, they will also improve patient care.

This evolving pattern-recognition technology being used by Behold. AI will be able to automate a radiologist's diagnostic task and also spot new connections, unearthing new links and patterns that can expand clinicians' knowledge.

Only the AIs have it

Behold.AI, which combines convolutional neural network architectures with massive computing power to allow software programs to identify visual differences between healthy and unhealthy body parts, will be looking at each x-ray in much more detail than the human eye can – at the level of each individual pixel.

We are still not sure what it will find when it will see things at such a minute detail, but that could provide a step change in our diagnostic abilities.

Also, instead of sending people home to wait for the result of their x-ray, AI can produce it in an instant, perhaps spotting a lung problem or pneumonia that requires urgent treatment that should in no way see the patient sent home. And think of the expense when that patient is brought back by an ambulance, the savings and improvement in care could be exponential.

Radiology has been digitising its images for a long time, which makes it a richer data set than many other departments and a good place for AI to start, but the scope of the technology means it can help clinicians and administrators.

For example, the hospital manager looking at performance data can interrogate an AI system to see how to improve porters' routes taking patients to A&E.

Unlike other sectors, however, where companies like Amazon and Facebook have been able to use AI in combination with data from online users' behaviour to give us recommendations, the highly regulated healthcare industry does not grant such easy access to patient data.

Maintaining the security and confidentiality of patient data is a key priority as shown in the recent scandal involving Google DeepMind and the Royal Free London NHS Foundation Trust, which led to the transfer of identifiable patient records across the entire Trust, without explicit consent.

The General Data Protection Regulation (GDPR), introduced by the European Parliament in 2017 and brought into force in mid-2018, is aimed at addressing rising concerns with how data is accessed, stored and shared.

The GDPR will have significant implications not only for EU-based organisations, but also for non-EU based organisations that conduct business in EU countries and it can be expected that a similar regulation will be implemented internationally.

Whose data is it anyway?

Then there is the question of who owns the data. A judge in Ohio, US, ruled in July 2017 that data from a pacemaker could be used against the man wearing it in an arson case.

GDPR is an added complication for AI start-ups holding vast amounts of patient data, but despite the challenge of ensuring the security and confidentiality of patient data, there is a strong commitment by academics, regulators and healthcare providers towards more evidence-based medicine and a drive to improve the quality of healthcare services through AI.

Speaking at the 2017 NHS Expo, NHS England Chief Executive Simon Stevens said the NHS needs to recommit to exploiting the potential of anonymised clinical data for driving research and innovation.

The NHS is leading the way with AI with multiple trials across hospitals. Those that can show a high-level of accuracy and data security will be able to scale rapidly across the system thanks to the connected nature of the NHS.

Our research with Behold.AI will follow this process, examining the impact of AI on work productivity and the scaling up of diagnostic processes plus how it develops professional collaborations. We will follow Behold.AI's every step as the platform scales up to incorporate more value creation interactions in what could be a dramatic revolution for healthcare services in the UK.

Panos Constantinides is Associate Professor of Digital Innovation at Warwick Business School and Academic Director of the Artificial Intelligence Innovation Network.
E: Panos.Constantinides@wbs.ac.uk

Simon Rasalingham is Chairman and CEO of Behold.AI, which he acquired in October 2017. He previously founded teleradiology provider MEDICA before selling it to Nuffield Health in 2013.

Further Reading:

Quer, G., et al, 2017. Augmenting diagnostic vision with AI. *The Lancet*, 390(10091), pp. 221.

Constantinides, P., and Fitzmaurice, D. (2018). Artificial Intelligence in Cardiology: Applications, Benefits and Challenges. *British Journal of Cardiology*, 25(3), pp. 1-3.

Skilton, M., 2018. Seven Technologies that will Revolutionise Healthcare. Available at: https://www.wbs.ac.uk/news/seven-technologies-that-will-revolutionise-healthcare/

CBI Insights, 2017. The State of Artificial Intelligence – Recent advances, start-up landscape, the road ahead.

Constantinides, P., Henfridsson, O., and Parker, G.G., 2018. Platforms and Infrastructures in the Digital Age. *Information Systems Research*, Articles in Advance, pp. 1-20.

Reducing slip-ups to save lives

Overcoming barriers to the dissemination of good practice and innovation.

by **Graeme Currie**

As an academic it is not often possible to say that your research led directly to lives being saved. However, this was one particularly positive outcome of research conducted by myself and colleagues Nicola Burgess and James Hayton at Warwick Business School into knowledge diffusion and brokering in the English National Health Service (NHS).

In an ideal organisation, knowledge about good practice would make its way from wherever it originates, often at the frontline of service provision, to the parts of the organisation where it is useful. Unfortunately, this is rarely the case. And, while in most organisations a failure to disseminate innovation and good practice might have a negative impact on profits, business development and competitiveness, in some organisations it can mean the difference between life and death.

This is certainly the case in healthcare. Yet, as our work on healthcare improvement with the Organising Heath Research Network shows, through comparatively small changes in approach it is possible to make significant improvements in patient safety. Moreover, it is possible to extract lessons from our studies that can help disseminate good practice innovation outside a healthcare setting.

Our study initially spanned a period of almost three years with a number of key components involved. First, there is the concept of knowledge brokering itself, the act of getting the right knowledge, into the right hands, at the right time. Often presented as a panacea for disseminating best practice within or across organisations our studies show that, in organisations such as hospitals, hierarchies of status and power prevalent in these professional bureaucracies present significant barriers to effective knowledge brokering.

In the context of knowledge brokering we looked at the role of the 'hybrid middle manager'; these are managers who participate in both practice and management.

In our studies hybrid middle managers ranged from below executive director level all the way to ward managers and included: clinical directors and consultants, who tend to head up and lead medical teams in different specialties; nurse managers, where they have responsibility for ensuring clinical governance, who typically work in concert with the clinical directors; and ward managers leading care delivery teams.

The extent to which the hybrid middle managers split between managerial and clinical duties varied. They may or may not directly deliver service on the ground, but are likely to be both clinically practising and performing a managerial role. With a foot in both management and practice domains, hybrid middle managers are crucial brokers of quality improvement related knowledge within a healthcare provider, both upwards and downwards.

Patient safety

In investigating the role of hybrid middle managers in relation to knowledge brokering, we focused on the elderly and associated patient safety problem and, in particular, incidents of falls and preventing them.

The regulator monitoring Hospital A's patient safety performance had criticised it due to the high incidence of falls and poor response in managing them.

The clinical governance system is the mechanism through which this type of issue should be addressed, with ultimate responsibility resting with the Chief Executive. However, our study revealed a process that tended to become characterised by a culture of entrapment. Criticism provoked defensiveness: the governance process ground to a halt, replaced by efforts to buffer the local organisation from regulatory pressure. An unhealthy response, but not uncommon in such circumstances.

Meanwhile, on the frontline in service delivery there were eight wards, all sited relatively near to each other, experiencing high levels of falls. Closer examination uncovered good examples of local innovation aimed at reducing the incidence of falls in one of these wards; good practice that would be useful to other wards and hospitals.

> “Hierarchy also affects the dissemination of knowledge between medical professionals where the issue is predominately one of status. This was evident in doctors. As one doctor said: *“Some doctors are more equal than others.”*”

Older patients were put into cohorts, with a risk assessment to assess a patient’s likelihood of falling. Patients most at risk of falling were put near to the nursing desk so that if a patient needed to move, to go to the toilet for example, they would get a quicker response from the nurses.

Yet, despite all eight wards suffering similar problems, and despite their physical proximity, that innovation was only disseminated to one other ward. This seemed surprising. However, the reasons for the lack of dissemination became clearer when we interviewed staff and reviewed the archive of documents and materials amassed during the study. Those reasons were rooted in the workplace hierarchies that existed.

Knowing your place

In some ways the hierarchies in nursing are much like in the military. Hybrid nurse middle managers in clinical governance roles draw on their status and formal position in the organisation to influence nursing activity. Unfortunately, it is that same status and formal position that discourages the nurses delivering frontline care from sharing their knowledge and ideas about improving patient safety in the care of older people.

The evidence showed that although senior nurse managers could make demands of ward managers and expect them to comply, ward managers could not take local innovation and knowledge and ensure that it reached further up the organisation by influencing senior nursing managers. Where good practice did reach one other ward it was due to the good personal relationship between the respective ward managers.

Nor were formal structures in place to ameliorate the powerful hierarchical effect. Hybrid nurse middle managers had to resort to the nursing equivalent of managing by wandering around. These “patient safety rounds” were intended to circumvent hierarchy and access knowledge held by junior staff.

Hierarchy also affects the dissemination of knowledge between medical professionals where the issue is predominately one of status. This was evident in doctors. As one doctor said: “Some [doctors] are more equal than others.”

Take geriatricians, who commonly interact with their peers across many clinical departments where older patients are located. They deliver holistic care, are more involved with the patients than most doctors would be, and are well positioned to possess knowledge concerning patient safety improvement. However, geriatricians are also considered to be comparatively low status by other medical specialities, such as surgeons or anaesthetists and, therefore, find it difficult to influence their peers regarding the adoption of new practices.

Whereas, our evidence suggests that those medical specialists with high status who would be able to bring about changes do not see patient safety as their concern. Indeed, many believed it to be the domain of nurses, with some even refusing to attend meetings about patient falls. This attitude persists, even though the specialist wards invariably have significant numbers of elderly patients.

And there was the interaction between nurse middle managers and doctors, what is known as inter-professional hierarchy. Differences in the routes into the respective professions – reinforced by elitist attitudes across hospitals that medical professionals are more important than nurses – makes brokering of knowledge from nurse to doctor difficult. Again, many specialist doctors, other than geriatricians, tend to view patient safety as being the responsibility of nurses, and outside the compass of their role.

Both nurse managers and doctors have clinical and managerial roles, with their clinical service role impacting on the incidence of falls. The professional and managerial elements of the organisation needed to mesh and work together to be effective. But while we found that there was not necessarily tension between the two, our findings did show that the two are decoupled, managerial governance systems were not tightly enough linked to service delivery. For example, we found evidence that where there was a Serious Untoward Incident (SUI), and nurse managers were progressing governance procedures, doctors were reluctant to get involved beyond signing forms.

SHARING – hybrid nurse middle-managers play a crucial role in knowledge brokering

Mending the knowledge chain

We also uncovered examples of hybrid middle managers taking positive steps to ensure that information about falls best practice was disseminated from nursing staff to the highest levels of the organisation. From the hours of interview transcripts we found that bringing people together, including frontline staff, hybrid middle managers, and where possible senior management, creates opportunities for interaction and knowledge sharing, upwards and laterally, that might not otherwise take place. This might be through monthly multidisciplinary team meetings, for example, which can incorporate issues on wards, present serious incidents of patient falls, and discuss ongoing governance procedures. Or there may be specific structures set up to tackle a particular issue, such as falls.

Although the organisation of clinical practice might fail to provide opportunities for individuals to broker knowledge upward to higher-status clinicians, motivated individuals can step in to create opportunities to champion and influence change.

Take the situation where one geriatrician set out to educate peers about the importance of proactive fall prevention for patient safety. In doing so they were careful to frame the issue of preventing falls as relevant right across the organisation – to young patients, new mothers, cardiovascular patients, and stroke patients – and not just a matter pertinent to the care of older people. At the same time they leveraged social capital acquired over 30 years of practice to co-opt a senior nurse occupying the hybrid middle manager role of clinical quality, risk and safety manager, into prioritising falls as an organisation-wide issue.

‘Champions’ can also promote more effective knowledge brokering by influencing future generations of medical professionals. We discovered examples of early career intervention where a geriatrician focused on educating junior doctors in basic patient safety practices, emphasising the “team” role of doctors working alongside nurses. He explained that this increased the motivation of doctors to engage with patient safety because it routinised patient safety behaviours and encouraged them on to other doctors.

There was evidence too that doctors did not necessarily feel comfortable in or adequately prepared for the managerial element of their role. With nurses there is an observable career progression of nurse to ward manager, to matron and beyond, facilitating a gradual evolution of managerial status, aligned to experience. Ultimately this serves to empower hybrid nurse middle managers to influence practice for patient safety improvement. However, managerial identity remains an issue for doctors when positioned in hybrid middle

PAINFUL – reporting falls by elderly patients were treated as a tick-box exercise by hospital staff

manager roles, suggesting that they would benefit from greater learning and development opportunities.

The importance of effective performance management and targets were also highlighted, especially in a professional context where considerable emphasis is placed on evidence based decision-making and meeting targets. In one case, for example, data was available on fall incidence and the immediate consequences of those falls, but not on long-term consequences. It was impossible to analyse links between initial falls and eventual deaths. Capturing such data enabled the team to construct more accurate risk scores for falls and initiate data-driven action as a result.

Thus our studies highlighted possible HR mechanisms, such as job designs, performance management systems, and training and development interventions that could create opportunities for exchanging knowledge and motivate individuals to engage.

Beyond theory

Note that we do not seek to impose solutions. We may suggest solutions to improve knowledge brokering, for example, but we recognise that those solutions need contextualising. It is the people working in the hospitals who are best able to identify how those solutions might be translated into practice and implemented. Prior to our intervention the process following a fall, as we observed it, was as follows.

If, for example, an elderly person falls over on the ward and fractures their hip, this is recorded as an SUI; an incident that occurs in a healthcare setting, which results in unexpected or avoidable death, or moderate or serious harm to a patient. This triggers a Root Cause Analysis (RCA) report which includes an action plan for improvement; the RCA is presented to a clinical risk committee, typically by the relevant ward manager.

> “What tended not to happen were any remedial measures being acted upon, or any suggestions included in the action plan actually implemented.”

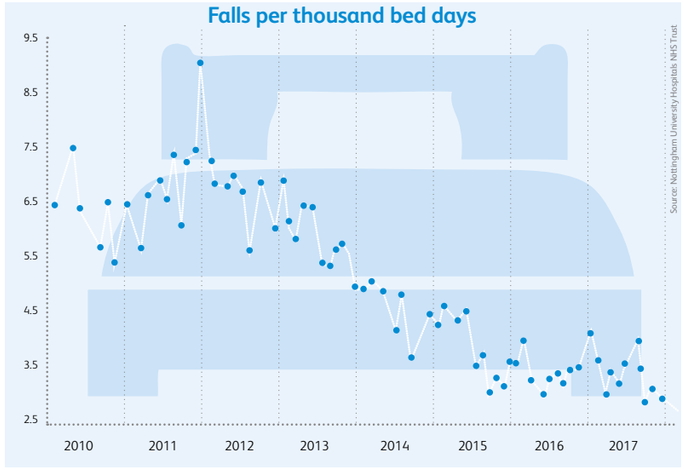
Then what tended to happen was one (or more) of three things. The incident would be dealt with in a relatively tokenistic way, a tick-box exercise, going through the motions to satisfy the patient, patient carer or relative. Or everyone might conclude that it was a systems failure, and not something that anyone could really do anything about. Or a member of staff, usually the ward manager, would end up having the blame pinned on them. Which, unsurprisingly, created an extremely defensive culture.

What tended not to happen were any remedial measures being acted upon, or any suggestions included in the action plan actually implemented. Regardless of the elaborate mechanisms and processes in place to deal with SUIs, despite there being a formal mechanism designed to elicit knowledge sharing and brokering, you got compliance at best. It was a governance system that had blame embedded in it.

Group meetings

We took each of the eight wards involved in turn and gathered as many people together as possible who were associated with that ward and fall prevention. The aim was to spend time discussing how issues relating to fall prevention could be addressed. What was the learning in service improvement? What are the types of innovation that could be diffused? These were two to three hour meetings.

The meetings were held in a learning centre, which was seen as a neutral space. It allowed us to gather all of the various teams together, and facilitate what are quite emotionally-laden interactions. With surgeons, geriatricians and nurses together, without facilitation you would be unlikely to hear every voice. In the normal work environment nurses might typically have acquiesced to the views of doctors, for example, not said anything, and then afterwards discussed it among themselves in a huddle. When that happens their insights are lost. In our meetings, nurses were allowed to have a voice and surgeons listened in a way that suspended what would typically be expected in day-to-day practice.



When doctors talk to clinical teams in front of their peers, and other associated professionals, they do not want to be seen as dismissing patient safety and the measures that might be taken to improve it. For example, those surgeons that might otherwise dismiss patient safety as someone else’s domain, would want to be seen as caring and at the cutting edge of the profession in terms of innovation, as that perception has an impact on their reputation among their peers and others.

It also provides an opportunity to engage evidence-driven medical professionals, such as surgeons, by presenting them with audit data, with evidence about the incidence of falls, where there had been interventions, and how those interventions had led to a decrease in the incidence of falls.

Falls Operational Group

A second key aspect of our work in the NHS Trust was our engagement with the managerial organisation in the hospital, specifically the clinical governance committee.

On governance our studies have revealed two significant flaws in existing practice. At present the climate within which the governance process took place left people feeling that they were on trial and, therefore, promoted defensiveness and reduced the prospect of knowledge dissemination. This climate needed moderating, which would involve subtle changes in the ways in which the clinical governance committee interacted with the ward manager and deputy ward manager and other team members at ward level.

The other flaw was that action plans developed as a result of RCAs were rarely followed up, either to see if action had been taken, or whether it worked. Therefore, if it did work there was no diffusion of learning.

Although this was partly a product of the volume of work and general busyness at the hospital we made some suggestions for improving the governance process.

We supported the development of a specific clinical governance sub-committee called the Falls Operational Group (FOG) and worked with them on following up action plans, service improvement, and diffusion of learning. The composition of FOG was particularly important as it was formed from a group of clinical champions, who were also opinion leaders, which meant that they were able to influence their peers towards better practice. Another key element was getting the Chief Executive to chair the group and bring their authority to it.

Making a difference

In many organisations there are middle managers who have both a managerial and service delivery role. These middle managers play a vital role in disseminating knowledge within the organisation. At the same time, particularly in professional organisations, hierarchies of power and status within the workforce can inhibit the ability or motivation for these middle managers to prevent the spread of good practice and innovation.

Our work shows how certain relatively simple HR measures such as facilitated group meetings, and the involvement of issue champions, can help circumvent barriers to the dissemination of learning. Even awareness of the issues surrounding hierarchies is useful.

When such measures are taken it can have a significant impact on organisational performance. And, in the healthcare sector, as this comment from a geriatrician in the NHS Trust that we worked with confirms, it can be the difference between life and death.

“The improvement work, which your project has been a part of, has seen a dramatic reduction in harm to our inpatients as a result of falls,” they wrote. “Since 2011/2012 we have halved the rate of inpatient falls, prevented more than 100 hip fractures and saved 60 lives.”

Graeme Currie is Professor of Public Management at Warwick Business School. He works closely with senior levels of public service organisations (including the NHS, police forces and local authorities), third sector (Ear Foundation), and the private sector (Alliance Boots).
E: Graeme.Currie@wbs.ac.uk

We're all going crypto crazy

What is driving the rollercoaster price of Bitcoin and its cryptocurrency siblings?

by **Daniele Bianchi**

Unless you have been living in a cave you could not have missed 'Bitcoin mania' sweeping the world in 2017 as its price rocketed 500 per cent.

Trading in the cryptocurrency reached such a frenzy one day in December that the price of Bitcoin surged $2,000 on Coinbase, the most popular trading exchange for cryptocurrencies, to reach $19,000 for one Bitcoin only to drop to $15,000 by the close of business.

The frenzy even saw people taking out mortgages to buy Bitcoin. Demand left some trading exchanges struggling to cope as the hype about this new currency grew.

Is it a bubble? Well, yes, Bitcoin saw 40 per cent of its value wiped off in a week at the end of March 2018, so was that the bubble popping? It is hard to tell, but this is no normal asset class. In fact, investing in Bitcoin is more like investing in a technology start-up, akin to the dot-com bubble at the end of the 1990s.

Bitcoin was the first cryptocurrency, invented by the real or imagined Satoshi Nakamoto, and released onto the web via open source software in 2009. It is a peer-to-peer currency that uses blockchain technology – a digital shared ledger that logs sales at the same time across multiple sites – to do away with the need of a central bank.

It has quickly been copied with more than 1,500 cryptocurrencies in existence now and that number is growing all the time. Bitcoin may have started out as a currency, but is seen more now as an investment. My research has found Bitcoin is like no other asset class and my advice would be not to invest, at least any serious money, in it.

My research looked at 14 of the biggest cryptocurrencies, including Bitcoin, from April 2016 to September 2017. Despite the vast number of cryptocurrencies being produced I found transactions in Bitcoin made up almost 80 per cent of the overall traded volume before early 2016, then declined to about 40 per cent by September 2017.

Indeed by September 2017 the market capitalisation of Bitcoin and Ethereum – a cryptocurrency using smart contracts and also a platform to launch Initial Coin Offerings (ICOs) – alone was about $65 billion and $28 billion, respectively.

This is the size of a large cap stock in the US, yet the end-of-sample median market capitalisation across the 14 cryptocurrencies, which made up 85 per cent of the total market capitalisation of cryptos, was about $850 million, which is more the size of a small cap stock.

I compared the cryptos with standard asset classes, like corporate bonds, equities, treasuries and commodities. The only thing that is slightly related is gold and everything else is uncorrelated.

But are they a store of value? Probably not as they are just too volatile. The only correlation to gold is that when there is a positive price change there is a positive move in Bitcoin, but the relationship is very low, only moving together to some extent.

Gold is seen as a safe haven, but cryptos can no way be seen as that, not in the short, long or medium term despite what some investors tell you. Predictions of Bitcoin rising to $30,000 are not based on any evidence, it is pure speculation.

Hedge with cryptos?

Is Bitcoin a good hedge? No, because it is not correlated with anything else, typically a hedge should be negatively correlated with your position. For now, it is just a risky investment. To use it as a hedge would be crazy in my view.

Cryptos are uncorrelated with the fundamentals of a market economy. So you might think you have an exposure to the UK stockmarket and you will buy Bitcoin because it is unrelated, but it is not negatively correlated - it is not correlated to anything - that is not a hedge, it's another risk. It is very difficult to predict where it is going in terms of price, in the short term especially.

I tried to see if it was related to economic fundamentals, like inflation expectation or interest rates, but I found there is no relationship. Demand is essentially driven by past prices, that is, people invest in it because they see the price going up and put momentum into it, which is why bubbles exist, though it is a rational bubble.

The data showed that the majority of the currency used to buy Bitcoin was Chinese Yuan, and in 2016 the majority of the miners - the computing process where transactions are added to the blockchain and new Bitcoins created – were in China, until the crackdown of the Chinese Government.

Rational investors will stay clear of it. The people investing in this are essentially retail investors and hedge funds. Regular pensions or mutual funds are so regulated they can't invest in it, but small hedge funds, which are completely opaque, they can do what they want. They can take the risks and that is part of their attraction, taking big bets for big returns. It is a way of making some money quickly.

CME Group and Cboe Global Markets, large US financial market companies operating in options and futures exchanges, have opened futures exchanges for Bitcoin, but I think they were cashing in on the hype. I am pretty sure it will be a blood bath as there is no way of predicting the price, but with a market capitalisation of a few billion dollars Bitcoin is very lucrative for CME and Cboe.

> "I am pretty sure it will be a blood bath"

Picking the new Amazon

Having said this, I think there is value in the underlying technology of some of the cryptocurrencies, like Ethereum. If you look at Amazon, at its beginning before the dot-com bubble burst, Amazon went from $25 to $100 and back to $25 when the bubble popped, but now it is around $1,400.

As soon as the technology was fixed and the flaws ironed out, it became popular and its value grew. I wouldn't be surprised if the same thing happens for cryptos, as soon as the problems have been fixed and the bad press dies away – because there are a lot of scams going on – it can happen again.

Bitcoin is supposed to be this peer-to-peer payment system, which is falling apart because people have realised it is slow and very expensive. It is the same with Ethereum, everybody was excited about its smart contract technology – a computerised verification process of contracts that eliminates the need for third parties – but people have found it is full of holes in the code.

If these technologies are fixed there is a good chance prices will climb again, but that is a big if. Central banks like the Bank of England and financial services companies in particular are very wary of cryptocurrencies and from their perspective you can see why.

A large fraction of the ICOs are scams. Up to a year ago it was simply a matter of having a nice website, a clean white paper and you could raise £2 million, but to do what? If you lose all the money there are no questions asked.

It was the Wild West, but now it is maturing, with professional people moving into the marketplace. Indeed, there are now websites that give ratings and rankings on the ICOs like Morningstar does for mutual funds. It is probably why prices are collapsing, because it is stabilising a bit.

Also the many exchanges will be attracting high frequency traders – computers automatically trading assets, typically stocks, in fractions of a second – who are taking advantage of arbitrage. If you look at the bid-ask spread – the amount by which the asking price exceeds the bidding price in a market – some exchanges' are big and some are small depending on the liquidity of the exchange, so then you can arbitrage, that is, buy in one and sell in another.

I think it is very possible 'algo-traders' are moving in. There are already Python codes available to download and start algo-trading. This could help provide efficiency in the price of cryptocurrencies in the future, smoothing out the volatility somewhat.

Another concern for banks, though, is that the underlying technology could see them bypassed. If you don't need any more financial intermediaries, J.P. Morgan and the like would lose everything, and if you take monetary policies away from central banks what do they have left?

So the banks have been predictably critical, but the UK Government is looking at blockchain technology to solve the productivity puzzle and to move the economy forward after Brexit. There is real interest in this technology from many areas.

Blockchain can be used in supply chain management, insurance and even ridding the world of plastic waste. With supply chain management, for example, you can track food from its source, so if there is some health problem you can find where it has come from instantly and shut down that supplier.

The one crypto with most potential is Ethereum because of its smart contract technology; there is some fundamental value behind it. It can be used in other areas, like derivatives, property contracts, financial services, legal processes and just about anything involving a contract.

Cryptocurrencies are a very risky investment and I don't think anybody can say otherwise. It is going to be like the dot-com bubble with a crash and a few winners emerging from the wreckage. But, at the moment, it is very difficult to see who will be the Amazons of the cryptocurrency craze.

Daniele Bianchi
Daniele Bianchi is an Assistant Professor of Finance at Warwick Business School. He has a PhD from Bocconi University and his research interests span empirical asset pricing, Bayesian econometrics, commodity markets, and cryptocurrencies.
E: Daniele.Bianchi@wbs.ac.uk

THE 14 BIGGEST CRYPTOCURRENCIES FIGURES AS OF JUNE 20 2018

NAME	DESCRIPTION	MARKET CAP	CIRCULATION
BITSHARES	An open-source Financial Smart Contracts platform that enables trading of digital assets and has market-pegged assets that track the value of their underlying asset.	$427m	2.6bn
BITCOIN	The original idea of Bitcoin was to provide a payment method with lower transaction fees than traditional online payment systems and is operated by a consensus network. Unlike normal currencies, Bitcoins are not guaranteed by any central bank or government.	$115bn	17m
BYTECOIN	Launched in 2012 and the first cryptocurrency based on the CryptoNote protocol with an open source code designed for anonymous cash settlement. It protects the user's privacy by securing the transactions as the identities of the sender, the receiver and the amount of transaction are all concealed.	$736m	183.9m
DASH	An open source peer-to-peer cryptocurrency offering instant transactions (InstantSend), and private transactions (PrivateSend), with individuals and businesses paid to perform work. New blocks are created by the miners while second tier "masternodes" perform PrivateSend, InstantSend, and governance functions.	$2bn	8.1m
DOGECOIN	Although launched as a 'joke currency' in 2013, Dogecoin quickly developed its own online community. It has gained traction as a payment method in social media by which users grant Dogecoin tips to other users for providing interesting or noteworthy content on places like Twitter and Reddit.	$348m	114.9bn
ETHEREUM	An open-source distributed computing platform which features smart contracts, so people can exchange a contract without the need for a third-party, like a lawyer, as the contract is embedded in code and is trackable and irreversible.	$44.3bn	100.7m
FACTOM	An open-source blockchain-based protocol that allows people to store any type of data, from financial transactions to simple business analysis. It provides a document authentication solution that secures physical documents on the blockchain.	$107m	8.75m
GAME CREDITS	Made to let gamers and game developers buy and sell games plus in-game features fast, safely and privately through a decentralised platform. The processing time for each block is 90 seconds and miners' reward is currently 12.5 coins.	$56m	64.3m
LITECOIN	Nearly identical to Bitcoin, except it has almost zero payment cost and facilitates payments faster than Bitcoin by having a decreased block generation time. It also has a higher maximum number of coins and uses a different hashing algorithm.	$5.5bn	57m
MONERO	Units of Monero are fungible, ie all coins have the same market value irrespective of time or place. Unlike public-ledger cryptocurrencies where addresses previously associated with undesired activity can be blacklisted and refused by members, Monero is totally private. It hides the sending address and the receiving address.	$1.95bn	16.1m
NEM	Launched in 2015, NEM is based on a proof-of-importance algorithm to check users, so it does not require a lot of computing power and energy to mine. NEM is private and has a licensed commercial version called Mijin, which makes NEM the first attempt at a public/private combination in blockchain implementation.	$1.7bn	9bn
RIPPLE	Ripple (XRP) is the native currency of the Ripple network, an open-source, distributed peer-to-peer real-time gross settlement system, currency exchange and remittance network. XRP is a scarce asset with decreasing available supply. One of the specific functions of XRP is as a bridge currency, so you can exchange it for dollars or euros.	$21.3bn	39.2bn
SIACOIN	Part of the Sia network which provides decentralised, encrypted, peer-to-peer storage. Companies host their own decentralised cloud on Sia and sell storage on it in exchange for Siacoin.	$452m	35.2bn
STEEM	This is a native currency for the Steemit social media platform which allows publishers to monetise their online content and community, based on battle-tested blockchain technology. Due to increasing demand pressure the inflation rate of Steem was changed to 9.5 per cent per year, reducing by 0.5 per cent a year.	$424m	262m

6 WAYS OPEN BANKING WILL REVOLUTIONISE FINANCIAL SERVICES

Banks are being forced to open up their data and it could transform the sector.

by **Markos Zachariadis & Pinar Ozcan**

You take out your smartphone and log onto Amazon to make a credit card payment, transfer some money into your ISA savings account and, as a small business owner, check your current cash flow.

While you are there, you are offered better terms on your business loan, kept up to date on your current re-mortgaging application, and reminded about a new IPO investment opportunity.

It may not be reality just yet, but a revolution is underway in Europe's retail banking sector. The innocuously named second Payment Services Directive (PSD2), that came into effect in the EU earlier this year and in the UK at the same time under the name 'open banking', has laid the foundations for a dramatic reshaping of retail banking.

While the phenomenon of open banking is likely to spread to the US and elsewhere, for the moment the UK, with its unique co-location of financial services centre and fintech hub in London, is probably the best example of the motivation for and mechanisms of open banking.

The domination of UK retail banking by a small number of banks, limits competition and leads to restricted choice of products and services for consumers. In addition, the heavily regulated nature of banking makes it difficult for new firms to enter the market.

The introduction of open banking is intended to create a more competitive environment, forcing banks to share privately held customer information with third party providers (TPPs), under certain conditions.

Easy open access to customer data should create a level playing field for the incumbent banks and any other licensed firms that wish to provide financial products and services.

With customers' consent, licensed TPPs will be able to access customer data held by banks, using standard, public and open (as opposed to proprietary, internal and private) Application Programming Interfaces (APIs) – the technology that allows one piece of software to communicate with another.

TPPs can also access other data about bank services, prices and service quality. Access to all this information improves a TPP's ability to offer services to existing bank customers and other consumers.

Open banking is still in its infancy. The eventual effects are uncertain, and there will inevitably be reservations, around data privacy and security, for example, given the current climate. But we are sure that the retail banking experience is about to undergo a radical reinvention, and that this revolution will eventually extend to financial services more generally.

After spending well over a year interviewing the various players involved, and researching the mechanisms and market, we are able to outline some of the more important effects of this initiative, ways in which open banking will impact retail banking, financial services and the business world beyond.

Consumer convenience At the moment individuals and small businesses often have more than one bank account. They may use one account for day-to-day transactions, have an ISA with another bank, and a credit card with a third.

Viewing financial details becomes cumbersome, involving a variety of different applications, websites and passwords. Similarly, applying for a financial services product such as a loan, often means completing multiple forms with different banks.

Open banking changes this, allowing TPPs to provide a far more efficient, integrated, convenient and transparent service for clients than the traditional banks can at present.

A TPP can aggregate and integrate customer data from multiple banks, present that information in an easy to understand way, and use that to provide single point access to a range of suggested products, services and expert advice, based on analysis of that aggregated information.

The convenience of one-stop visibility on their finances will help to improve the performance of SMEs' finance function - by enabling better liquidity management. As open banking develops, TPPs will integrate other applications into their platforms. Just as a property search application might seamlessly include Google maps to enhance the app's utility without leaving that application, so new financial platforms will integrate a range of additional services that may not directly relate to financial services but create additional value.

Consumer choice As well as convenience, consumers will benefit from better product and service choice as well as pricing. Previously, traditional banks captured customers, cloistering customer data, and offering the customer proprietary services.

With exclusive access to its customers' data, revenue and expenditure details, spending habits, and repayment track record, the bank was at a significant competitive advantage when making decisions about the products and services to offer its customers.

Now the banks, along with other TPPs, will be part of a new financial services ecosystem, using open data to provide value to consumers with much less friction.

Fintechs are unlikely to provide the products and services that they offer directly, instead acting as a layer on top of the actual provider (which may be a traditional bank).

But by aggregating and analysing customer data, the services traditionally available from banks, such as accounts, lending, borrowing, and investments, as well as more innovative offerings, are likely to be available via Fintech TPPs with better choice, better pricing and a better consumer experience.

For example, a TPP might provide a lending platform that, using sophisticated technology to analyse customer data and make customer behaviour predictions, can offer more competitive terms, while achieving lower default rates.

Or a customer could give permission to access their data to a TPP, which could then make investment suggestions based on the risk profile that the customer indicates. Pensions and mortgages are other obvious services that will be affected.

Furthermore, SMEs may be able to obtain business and finance advisory services via TPPs, which would not otherwise be available due to cost. And, while individuals have long enjoyed free banking services, unlike SMEs, there are signs that open banking may create a level of free banking for SMEs too.

The democratisation of banking services Open banking enables many people to have a bank account who would normally be unable to access banking services via a traditional bank.

For numerous reasons – no permanent address, poor credit rating scores, international students who come to the UK for a limited period – there are many people in the UK unable to access banking services.

With open banking, TPPs can take advantage of new banking regulations where, under a certain amount of money, they can give people access to a bank account number and a prepaid card.

In order to do this the TPPs need to obtain a specific type of licence; they can then piggyback on the infrastructure of traditional banks and, using prepaid accounts, allow previously excluded people to set up a bank account.

Democratising access to financial services in this way has huge implications for the wider economy. It economically empowers segments of society who were limited in the extent to which they could actively participate in the economy.

It also allows these individuals to obtain better advice relating to financial matters, possibly helping to avoid mortgage arrears or credit card underpayment, for example. And it creates business opportunities for TPPs and other firms that can identify and service the needs of this customer segment.

Data control Many stories in the news, recently, have highlighted issues around data privacy and security; trading personal data for commercial gain, without the knowledge of the individuals concerned; poor implementation of technology allowing consumers to access the private data of other consumers; and hackers downloading massive databases of personal data.

All these situations involve an individual or organisation's loss of control over its own information. Open banking proceeds from the principle that the individual customer should have power over and control of their personal data, including that currently held by the banks they deal with. Customers can, therefore, provide or withdraw consent for access to personal data whenever they wish.

This may appear a trivial detail but its impact is huge. Data is the oil that lubricates the financial services market. Without customer data TPPs cannot provide competitive services. Customer permission becomes currency.

Now TPPs are competing for customer permission and must factor into their business model a way of incentivising consumers to provide permission. This is how a modern digital economy should work.

In addition, having control over their data helps to provide consumers with peace of mind regarding data security. They know that whenever they no longer want a TPP to have access to their data, they are able to retract permission in an automated and transparent way.

Rethinking business models Perhaps the biggest impact that open banking will have on the business world is the way that the provision of banking and financial services will be affected overall.

There is every chance that the retail banking landscape, for individuals and small business at least, will be almost unrecognisable from a consumer's perspective within five to 10 years.

Traditional banks must rethink their business models to survive. They can move to position themselves as TPPs, as most are, but face several challenges in doing so.

Customers may instinctively be reluctant for their personal data and financial arrangements to be shared among the traditional banks, rather than via new fintech TPPs.

> "There is likely to be a degree of destabilising, turmoil and confusion..."

The banks are also grappling with legacy IT systems and a fixation on compliance. Perhaps more problematic, however, is that the traditional banks may simply not be sufficiently agile, innovative, or technologically adept to compete with new entrants.

It is not clear that the traditional banks understand the scale of the threat or pace of change that is likely. If they wish to respond adequately it will require a huge shift in the traditional bank's understanding of how it offers value and makes revenue.

The banks should no longer be thinking about selling everything to the customer themselves, but instead about sharing with others. They should be thinking of competing through platforms, creating an ecosystem of reliable strategic partners - and sharing revenues on the products and services that those partners push to the customer. This is a move from traditional vertically integrated banking to a far more modular and networked architecture.

It is not only the traditional banks that will be threatened. Traditional service providers such as accountants, business consultants, pension advisers, and many others that obtain business through recommendation or tie-ups with banks, must find their place in the re-oriented value ecosystem, alongside new service providers.

Indeed, a wide range of companies supplying products and services may face increased competition, because of the greater transparency and choice available from TPPs offering a platform approach.

The march of the tech giants It is not just the Fintechs and consumers that stand to benefit from open banking either. Any organisation that can meet the necessary conditions to obtain a licence can trade as a TPP.

That includes giant technology companies such as Facebook, Amazon, and Google. Combine the huge amount of personal data that these digital behemoths possess, with their data analysis capabilities, and the personal customer data that the banks hold, and the tech giants are well positioned to dominate financial services.

They already have a customer base of hundreds of millions of users. Even if they do not move directly to play a role as TPPs, they can easily tie-up partnerships with Fintech TPPs or acquire them. These firms have already shown that they can leverage data to disintermediate other industries. Financial services is unlikely to be an exception.

For the tech giants it is just one more service that they can offer on top of everything else. Amazon, for example, is already making loans to selected online sellers through its Amazon Lending arm.

Open banking will take time to gain traction. Initially, there is likely to be a degree of destabilising, turmoil and confusion, as the market retools, reshapes, and reconfigures.

In a sense it is a race to become a platform and offer modern customer-friendly services. The starting gun sounded at the beginning of 2018, but it is not clear if all of the banks have left the blocks yet.

Banks will have to learn new ways of collaborating and balance that with security and compliance, and that will not be easy. The Fintechs, for the time being, are likely to remain a shiny products and services veneer, resting on top of the balance sheets and infrastructure of the traditional banks and other established financial service providers.

If open banking is to deliver the benefits it promises, there are still challenges to be met. Without enough fintechs entering the market as TPPs we may not get the competitive market envisaged.

There are risks that the tech giants may exert a monopolist-like influence on the market. People need to trust TPPs enough to provide data access permission, and make digital payments and transactions to create the data that TPPs rely on. Traditional banks and partnering Fintechs will need to resolve branding issues.

But change is inevitable. Business transformation, facilitated by digital technology, has led to the collapse of entire markets. Banks may not disappear in the near future, especially given the heavily regulated environment, but while the future configuration of the open banking universe may be uncertain, one thing is for sure, retail banking and the financial services industry is on the cusp of momentous upheaval. And consumers willing to share their personal data are likely to benefit with interest.

Markos Zachariadis is Associate Professor of Information Systems & Management at Warwick Business School and Fintech Research Fellow at the Cambridge Centre for Digital Innovation.
E: Markos.Zachariadis@wbs.ac.uk

Pinar Ozcan is Associate Professor of Strategic Management at Warwick Business School and was selected for the Thinkers50 Radar list as a business thinker to watch.
E: Pinar.Ozcan@wbs.ac.uk

YOU ARE JUST AN ILLUSION

Still searching for the real ‘you’? It’s time to give up, you have been on a wild goose chase.

by **Nick Chater**

In fiction, while some characters are 'two-dimensional', others seem to have real 'depth'. They can, indeed, assume in our imagination a vividness that may equal, or even exceed, that of some of our living acquaintances. We may attribute to them attitudes and beliefs beyond the printed page.

Yet such apparent depth is, of course, 'in the eye of the beholder': there are no facts about Anna Karenina's life, save what Tolstoy gives us; no hidden motives lurking between the lines.

As for fictional characters, so for real people. The sense that behaviour is merely the surface of a vast sea, immeasurably deep and teeming with inner motives, beliefs and desires whose power we can barely sense is a conjuring trick played by our own minds. The truth is not that the depths are empty, or even shallow, but that the surface is all there is.

As we have already seen, it is awfully tempting – especially for psychologists – to suspect that while our everyday, common-sense explanations of ourselves and each other, as guided by beliefs, desires, hopes and fears, may be wrong in detail, they are right in spirit.

Anna's leap to her death in Tolstoy's classic is, one may think, guided by some beliefs, desires, hopes and fears, even though she may not be able to tell us quite which beliefs, desires, hopes and fears. Her introspection is imperfect or perhaps untrustworthy.

But the problem with our everyday view of our minds is far deeper: no-one, at any point in human history, has ever been guided by inner beliefs or desires, any more than any human being has been possessed by evil spirits or watched over by a guardian angel.

Beliefs, motives and other imagined inhabitants of our 'inner world' are entirely a figment of our imaginations. The stories we tell to justify and explain our own and others' behaviour aren't just wrong in detail – they are a thorough-going fabrication from start to finish.

Our flow of conscious thought, including our explanations of our own and each other's behaviour, are creations in the moment, not reports of (or even speculations about) a chain of inner mental events.

Our mind is continually interpreting, justifying and making sense of our own behaviour, just as we make sense of the behaviour of the people around us, or characters in fiction.

If you cross-examine me, or any other reader, about Anna's motivations (Q: 'Did she think that jumping under the train would mean certain death?' A: 'Yes.' Q: 'Did she believe that Seryozha would be better off without her?' A: 'Possibly – though almost certainly quite wrongly'; and so on), I will generate answers, as quick as a flash.

So we clearly have the ability to fabricate justifications at will, but these justifications cannot, of course, be conjectures about Anna's mental life, because Anna, being a fictional character, has no mental life.

If Anna were real, and had survived, we could cross-examine her, in her Swiss sanatorium, with just the same questions, and she too could reply, quick as a flash. And, for that matter, were you to cross-examine me about some prosaic aspect of my own life (for example, why I took the train, rather than driving, to London), I can come back with a string of explanations (about carbon emissions, traffic congestion, parking etc.).

The sheer inventiveness of our minds implies that the real Anna could be interpreting and justifying her own thoughts and behaviour, in retrospect, using exactly the imaginative powers that we are using when considering her as a fictional character by the imaginative work of Tolstoy himself in creating her story.

And this suggests that this very same inventiveness could underlie the stream of justifications we provide to explain our everyday lives to ourselves and each other.

I want to convince you that the mind is flat: that the very idea of mental depth is an illusion. The mind is, instead, a consummate improviser, inventing actions, and beliefs and desires to explain those actions, with wonderful fluidity.

But these momentary inventions are flimsy, fragmented and self-contradictory; they are like a film set, seeming solid when viewed through the camera, but constructed from cardboard.

An improvising mind, unmoored from stable beliefs and desires, might seem to be a recipe for mental chaos. I shall argue that the opposite is true: the very task of our improvising mind is to make our thoughts and behaviour as coherent as possible – to stay 'in character' as well as we are able.

To do so, our brains must strive continually to think and act in the current moment in a way that aligns as well as possible our prior thoughts and actions. We are like judges deciding each new legal case by referring to, and reinterpreting, an ever-growing body of previous cases.

So the secret of our minds lies not in supposed hidden depths, but in our remarkable ability to creatively improvise our present, on the theme of our past.

The argument has two parts. First, I attempt to clear away what I take to be fundamental and widespread misunderstand-ings of how our mind works. I then turn to present a positive account of the brain as a ceaseless improviser.

More concretely, we will explore the psychological evidence that talk of beliefs, desires, hopes and fears is pure fiction. Yet it is such convincing fiction, and so effortlessly and fluently invented by our own brains, that we take it for reality.

We'll find that almost everything we think we know about our minds is false. This is not the story from the psychology textbook. According to that story, common sense is roughly on the right track, but just needs to be modified, adjusted and filled out.

But these modifications and adjustments never seem to work. The common-sense mind and the mind we discover through experiment just don't seem to fit

The secret of our minds lies not in supposed hidden depths, but in our remarkable ability to creatively improvise our present, on the theme of our past.

together. The common-sense story needs to be abandoned, not patched up.

Yet while the textbooks don't take a radical line, a growing number of philosophers, psychologists and neuroscientists do. I will point to the root cause of the problem with the common-sense view of the mind: that mental depth is an illusion.

We imagine that mirroring the outer world of people, objects, stars and noises there is an inner world of rich sensory experiences (the subjective experience of people, objects, stars and noises), not to mention our emotions, preferences, motives, hopes, fears, memories and beliefs.

The possibilities for exploration in this inner world seem vast. Just paying close attention to what we see and hear, and the states of our bodies, seems to reveal that our inner perceptual world is wonderfully rich; and that we just need to step off from direct sensory experience into the realm of the imagination that dreams, meditations and hypnosis seem to provide.

Or we can explore the vast archives of our memories, perhaps reliving fragments of childhood or student life; or we can discourse with ourselves endlessly about our beliefs and values.

There are many who suspect that the scale of our inner world is far greater still – that we should add into the mix subliminal perception, which slips into our minds without our noticing; that we have unconscious beliefs, motives, desires and perhaps even unconscious inner agents (for Freud, the id, ego, and superego; for Jung, the collective unconscious). And perhaps there is a self, or many selves, or a soul.

Many believe that with the right meditative practice, psychotherapy or even hallucinogenic drug, the doors to the rich inner world of the unconscious might be prised open. And, turning to neuroscience, it is natural to imagine that the contents of our inner world might one day be accessible to brain-scanners – which might 'read off' our beliefs, motives and feelings, whether conscious or not.

But all of this depth, richness and endless scope for exploration is utterly fake. There is no inner world. Our flow of momentary conscious experience is not the sparkling surface of a vast sea of thought – it is all there is.

ROLE PLAY – Greta Garbo as Anna Karenina in the 1935 film. Nick Chater argues our minds are consumate improvisors, inventing beliefs just as Tolstoy did for Anna

And, as we shall see, each momentary experience turns out to be startlingly sketchy – at any moment, we can recognise just one face, or read just one word, or identify just one object.

And when, like our imagined Anna, rehabilitating in the Alps, we begin to describe our feelings, or explain our actions, we are only creating stories, one step at a time, not exploring a pre-existing inner world of thoughts and feelings.

How do thoughts work?

The more outré 'inner worlds' of dreams, or mystical or drug-induced states, are similarly nothing more than streams of invention – acts of the imagination, not voyages of inner discovery. And the interpretation of dreams, far from boring deep into our psyche, is no more than one creative act set atop another.

The aim of part one of my book is to help reinterpret our intuitions about the nature of our own minds, and to undercut misconceptions that have been repeated and even amplified in many areas of philosophy, psychology, psychoanalysis, artificial intelligence and neuroscience.

But if the intuitive picture – of a rich and deep 'inner sea' of which our conscious thought is merely the glittering surface – is so utterly wrong, the obvious question is: what possible alternative story about human thought and behaviour could there be?

In part two, we take up this question. If the mind is flat, then our mental lives must exist purely at the 'mental surface'. Our brain is an improviser, and it bases its current improvisations on previous improvisations: it creates new momentary thoughts and experiences by drawing not on a hidden inner world of knowledge, beliefs and motives, but on memory traces of previous momentary thoughts and experiences.

The analogy with fiction is helpful here too. Tolstoy invents Anna's words and actions as he writes the novel. But he strives to make Anna's words and actions as coherent as possible – she should 'stay in character' or her character should 'develop' as the novel unfolds.

And when we interpret the behaviour of other people, and of ourselves, the same aim applies: a good interpretation is one that does not just make sense of the present moment, but links it with our past actions, words, and, indeed, interpretations.

Our brain is an engine that creates momentary conscious interpretations not by drawing on hidden inner depths, but by linking the present with the past, just as writing a novel involves linking its sentences together coherently, rather than creating an entire world.

Conscious experience is, therefore, the sequence of outputs of a cycle of thought, locking onto, and imposing meaning on, aspects of the sensory world. That is, we consciously experience the meaningful interpretations of the world that our brain creates, seeing words, objects and faces, and hearing voices, tunes or sirens.

But we are never conscious either of the inputs to each mental step or each step's internal workings. So we can report nothing to explain why we see an outcrop of rock as a pack of dogs, a fleeting facial expression as condescending or kindly, or why a line of poetry conjures up a vision of mortality or reminds us of childhood.

Each cycle of thought delivers a consciously experienced interpretation, but no explanation of where that interpretation comes from.

This is an exclusive extract from Nick Chater's new book *The Mind is Flat – The Illusion of Mental Depth and The Improvised Mind* published by Penguin.

Nick Chater is Professor of Behavioural Science at Warwick Business School; co-founder of the research consultancy Decision Technology. He is on the advisory board of the Cabinet Office's Behavioural Insights Team (BIT), popularly known as the 'Nudge Unit'.
E: Nick.Chater@wbs.ac.uk

The value of nothing

by **Daniel Read**

emember when your mum or dad would tell you not to have those sweets now because it would ruin your dinner? It turns out they had a pretty good idea of how to deal with intertemporal trade-offs.

Making decisions on what to do now that will affect our future are an everyday occurrence. Most of our decisions are intertemporal choices, ranging from the person on a diet agonising over a cream bun to the world's scientists and leaders convening every year to agonise over the problem of climate change.

Should we buy an expensive TV now or put the money into our pension plan? Shall I have children now or build up my career and then have children? Should we have more cheap flights now or reduce the number of planes to lower climate temperatures in the future?

These are intertemporal trade-offs and, despite economics teaching us we should weigh up the options, calculating the benefits between the two points in time and choosing the most beneficial, we don't always do this in a way that is best for us, or for society.

Instead experiments have shown time and again that we have no patience and pick the tempting offer available to us now – ie eating the cream bun even though we are on a diet.

The experiments usually involve money. Do you want £10 now or £15 in six months? Most people choose the £10 even though that is an effective APR (Annual Percentage Rate) of more than 100 per cent – what bank is offering that?!

Even when the ante is upped to £100 now or £150 in six months, most people still choose the £100 now.

No wonder those climate change conferences rarely come up with any solutions that involve denying ourselves anything now.

Rather, we want future societies to experience abstinence. As St Augustine said: "Lord, give me chastity and self-control – but not yet."

New research by myself and colleagues Chris Olivola and David Hardity has found a well-placed zero can nudge people to be more patient and wait for the larger-later reward.

Going back to the parent trying to get their child not to have a snack before dinner, what they are really talking about is the opportunity cost of eating the sweets.

An alternative way of saying this is "you will be giving up the enjoyment of your future dinner by having the snack now".

People typically do not think of the opportunity cost of missing out on the future benefit, but when this is explicitly pointed out to them our research shows people are more likely to hold on for the later-larger reward.

The power of a zero in developing patience

One experiment did this in the simplest possible way. We added zeroes to the usual money choice, which highlighted how each alternative option would pay out zero when the other option paid out.

It turns out that if you ask people to choose between £10 now and zero in six months or zero now and £15 in six months, they are more patient. That is, if you add two zeroes, each highlighting the opportunity cost of each option, you make people more likely to wait.

Why does this happen? We speculated that the main driver of this effect was in pointing out the opportunity cost of taking the immediate option. Perhaps pointing out the opportunity cost of the £10 now (that you won't get £15 later) makes you more patient.

We investigated this by having groups of people choose between £10 now and £15 in six months under two additional zero conditions. In one, only the £0 opportunity cost associated with the £10 was made explicit; in the other only the £0 associated with the £15 was made explicit. The only effect was that people were more patient when the opportunity cost of the earlier £10 was made explicit.

Why is that? Well, if we look at our example of the kid reaching for a packet of sweets and the parent warning it will spoil their future dinner, the child already knows that if they wait for their dinner, this means they will not get the snack now (this is a zero outcome). Their attention is completely focused on the current snack and how tempting it is.

On the other hand, if you were to say "if you wait for your dinner you will get no snack now" they are unlikely to become more patient – the child is not even thinking about dinner.

Blind to the future

The famous Austrian economist Eugen von Böhm-Bawerk observed how there is an asymmetry in how we view the present versus the future.

"The present always gets its rights," he said. "It forces itself upon us through our senses.

Scientists have shown we are really bad at delaying gratification even when the rewards are bigger, but new research has found a well-placed zero helps.

To cry for food when hungry occurs even to a baby. But the future, we must anticipate and picture."

We believe this is one reason for the effect of that zero – it makes what we will have to forego to get something now more salient.

Therefore moving people's attention to that future consequence of current consumption does have an effect on their thinking, but moving their attention toward the fact that if they don't take something now they won't have something now has no effect.

We changed the context, giving them real-life scenarios, such as the government has to choose between two programmes to control pollution; save 100 lives now (but save no lives 25 years from now) or save 200 lives 25 years from now (but save no lives now). It revealed the same pattern.

We tried to find out if people understood the effect of the zero in the choices they made. We used a number of methods, but when we asked people to explain their choices they weren't able to express the causal mechanism.

Just one per cent said "the reason why I chose the latter option was because I would have to give up the earlier option" and this percentage did not depend on which group they were in.

They didn't even mention the zero, so this is a classic nudge. You move your gaze towards that later option, but there is no thought about it in a conscious way, you are not really aware it is affecting your choice.

This relates to a lot of research in behavioural science, and that is highlighted by Nick Chater in his book *The Mind is Flat*, in that we really are attending to very little of the information in the world, and are even not always aware of what information is coming in. Daniel Kahneman famously said in his ground-breaking book *Thinking, Fast and Slow* "what you see is all there is" – we don't fill in any gaps.

Very often we make very momentous life decisions without realising it. For instance, imagine a 20 year-old decides to spend £500 on a new TV. If that money was invested at slightly over three per cent a year until they retired they would have £2,000 extra to retire on. So in buying that TV they are committing themselves to being significantly poorer when they retire, but it is doubtful that anyone is thinking about this when deciding about the TV.

But if the price ticket was framed as a choice between a TV now and £0 at age 65, or no TV now and £2,000 upon your retirement, it is likely that fewer TVs would be sold.

This may seem like a radical solution, but it is very similar to calorie labelling on food. The label is there to remind you of the opportunity cost of consuming the yummy food, and I believe it would be useful to remind people of the opportunity cost of their purchases.

The "zero nudge" is one way of drawing attention to opportunity costs, but not the only way. Highlighting the opportunity cost even with something as small as a well-placed zero can make people more patient. It won't stop global warming, but interventions like these are one piece of the larger puzzle.

Once again the evidence is clear – we should always listen to our parents.

ZERO NUDGE – highlighting the opportunity cost can make people take a different decision

Daniel Read is Professor of Behavioural Science at Warwick Business School and has consulted to the UK government and the Financial Services Authority on behavioural economics.
E: Daniel.Read@wbs.ac.uk

Engineering the right environment for women to thrive

In male-dominated professions like engineering 40 per cent of women leave. Here is what firms can do to help close the gender gap.

by **Dulini Fernando**

"This is a man's world," sang James Brown, as he celebrated men's achievements in automotive, locomotive, marine and electrical engineering. And, while women have made substantial inroads into the world of work and organisational hierarchies since Brown first sang that refrain half a century ago, many Science, Technology, Engineering and Maths (STEM) related fields such as engineering, still appear stubbornly resistant to gender diversity. Even from the perspective of many of the women who actually work in these industries.

This might seem surprising, given that the benefits of workforce diversity at all levels, from the frontline to senior management, are fairly well-established. Yet, while many businesses have made considerable progress on diversity, others remain bastions of masculinity.

Engineering is a good example. Despite the best efforts of many firms, gender equality in terms of employee numbers is still elusive. Close to 40 per cent of women who gain engineering degrees eventually decide to leave the profession.

Research has identified many barriers that deter women from establishing careers in a male-dominated context. The exclusion of women from male-oriented social networks, long-hours working cultures with social activities taking place in pubs and sports clubs, stereotyping women as technically incompetent, perceiving women first and foremost in terms of sexuality and appearance – these are just a few.

However, there are women who manage to forge successful careers, over many years, in work environments dominated by men, including engineering. Together with my research colleagues, Laurie Cohen and Joanne Duberley, we decided to get closer to the problem, and actually listen to these women and learn from their experiences. We hoped that we might uncover insights to help organisations facing a similar challenge and improve gender diversity over the long term.

Rather than talking to organisations about company-wide initiatives, we interviewed 34 women engineers in two FTSE 100 firms (10 early in their careers, 19 in mid-career and five in late-career). The organisations that these women work for are male-dominated with entrenched masculine cultures. However, they had good intentions, they wanted to increase the number of women engineers. Yet regardless of the policies the employers introduced, women were reluctant to stay.

We tried to understand the factors that helped women to stay in their organisations. Our intention was to build a rounded, holistic understanding of the interviewees as individuals.

Key factors that help women stay

One of the main findings to emerge was the significance of the micro-environment – the immediate surroundings – that the women worked in. This might involve, for example, the line manager, the team that a woman engineer worked with on a day-to-day basis, the culture in that notional space. In turn, interaction with and perception of that micro-environment affected the way that the women thought, felt and acted.

So, for example, there might be aspects of work that an individual interpreted as exclusion at the broad organisational level. A woman engineer may well be unhappy with the way that their organisation is run in that respect. They may even be part of an effort to change that. And, if that broader macro-organisational environment is the main influence on the way that individual thinks, feels and acts, then they may not stay in the organisation.

However, if the micro-climate, and the micro-environment are sufficiently positive; if the individual gets on well with their line manager and any mentors they have; if they have co-operative supportive and interesting colleagues; if there is a positive nurturing micro-climate, all this can act as a buffer against negative forces in the broader organisation.

It was clear from our conversations that the women found engineering a challenging space, but with the right help early in their careers, they were willing to remain. There were several areas in particular where help could be decisive. These areas, in the majority of cases, concerned actions and initiatives that helped to create a positive micro-environment for women in their everyday work. There were also four areas where line managers played a key role in contributing to that micro-environment.

1 Opening up opportunities

It is important that women are offered opportunities to test existing skill levels and build confidence in their own abilities and, in doing so, to create the kind of internal visibility necessary to advance their careers. It was clear from our conversations that perceptions of competence were an issue. This was partly about men lacking confidence in the competence of female employees, but primarily women expressing doubts (invariably unfounded) about their own competence.

This lack of confidence in their own abilities may be due to gender-based micro-aggression in the workplace, or workplace isolation from important networks, for example. Whatever the reasons, these doubts prevent women from seeking out and seizing opportunities to advance their careers, making them less adept at self-promotion.

While women may consider confidence an inherent trait, our studies suggest that confidence is partly the product of social experiences in the workplace and, as such, needs to be built.

Line managers can take action by offering opportunities that will help women boost their confidence. They can offer 'stretch' assignments and other opportunities that test existing skill levels, or they might suggest standing in for them or another colleague with more senior responsibilities, temporarily assuming a position of higher leadership.

Moreover, if women are reluctant to accept higher level work, line managers can provide the necessary encouragement and support that enables women to accept these opportunities. Successfully completing these types of assignments then creates positive reinforcement.

Another part of what line managers are doing here is helping to create visibility. For women who are fearful of being visible, who are not putting themselves forward, possibly because of a lack of self-confidence, line managers can help to create a platform. In doing so line managers promote career-enhancing visibility and access to higher level networks.

2 Personalised feedback

Another area where line managers can help is with the provision of feedback. Most line managers provide feedback in one form or another, but the women we spoke to were very specific about the kind of feedback that made a real difference.

This feedback addressed a number of issues that the women engineers had, around how best to approach a task or finding the right technical area to specialise in, for example.

The feedback that they needed was personalised, constructive, and regular. It was not an institutional routine tick-box exercise, mandated by the organisation, but something that line managers took upon themselves to do.

It was feedback from line managers that demonstrated an interest in the individual engineer's work, and signalled that the manager had taken time to understand the engineer's strengths and weaknesses. This understanding allowed line managers to discuss knowledge gaps and learning needs in order to help female engineers improve performance.

For the recipient the feedback was invaluable in terms of providing specific tailored advice. It gave the recipient a sense of direction, of where they were, how they could progress, and what they needed to work on in order to improve.

A common issue for women working in STEM professions is that the career path is not always obvious. However, the line manager offering guidance about possible routes forward, helps to inspire confidence and reinforce the idea that career longevity is possible.

> Rarely do organisations listen to people speak.
> Rarely do they obtain the views of the women working there
> and try to understand what actually matters...

3 Peer support

Beyond personalised feedback and help with identifying project and task opportunities, women found general peer support useful. Again this was something that happened in the micro-environment.

Women valued support from line managers and colleagues creating an inclusive micro-environment. This was particularly relevant in terms of judgement about performance, for example. Everyone makes mistakes at work. How we are treated when we make those mistakes can have a huge impact on employee loyalty, and how the employees feel about the organisation that they work in.

The women we interviewed appreciated support from their immediate work group if something had gone wrong – it engendered a feeling of being valued and cared for. It was also relevant when women encountered threatening or difficult situations. In such male-dominated environments this might, unfortunately, as it did with one of the interviewees, involve dealing with inappropriate behaviour from colleagues, for example.

For line managers it is often a case of listening to the concerns of women employees and taking them seriously. In the case of mistakes, allaying concerns and reassuring the employee that they are doing well. In the case of inappropriate behaviour, advising an employee of the correct procedures to follow and offering support. This is on top of creating a nurturing culture and environment in which peer support is encouraged and freely given.

4 Role models

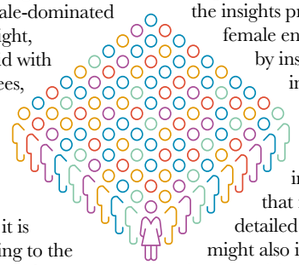
The idea that role models are important for encouraging workplace diversity, especially at senior levels, is not new. But in STEM professions where there are so few women, role models play a crucial role in overcoming a prevailing sentiment that career progression and success is difficult for women to combine with motherhood and having a family.

Here the concept of role models is not necessarily passive; not just a case that women who have successfully combined an engineering career and a family exist in the organisation at some level.

Organisations can be proactive, making role models more visible. Role models should be able to tell their story, to challenge stereotypes by relating their experiences, to explain how they have coped, in order to make the aspiration of combining a respected career in engineering with motherhood and family life seem something that is both tangible and achievable.

Listening to the underrepresented

Organisations can take advantage of the insights provided by the many female engineers that we spoke to, by institutionalising these insights as part of their HR practices.



Line managers can be trained to recognise intervention opportunities that relate to the factors detailed above. Organisations might also incentivise good practice by recognising and rewarding employees who demonstrate supportive behaviours.

It is important to emphasise that the will and impetus must come from the line manager – and peers – and not just from senior management directives and mandates. Many of the women stressed that positive action from their line managers was ad-hoc rather than part of an organisation-wide programme.

Organisations often adopt the wrong approach to diversity and inclusion – certainly in terms of getting women to continue in STEM-related professions, at least. Diversity and inclusion policies are often set at a very macro, mechanical level. They are directive and have labels attached – policies, regulation, rules, codes, targets.

Rarely do organisations listen to people speak. Rarely do they obtain the views of the women working there and try to understand what actually matters to those women. Seldom are those voices and insights captured in HR practices. A bottom-up approach is required.

A good example is the feedback we obtained about networks established specifically for women. The creation of a woman-focused network is often a stock policy to encourage gender diversity in organisations. And in many organisations they may well serve a positive purpose.

However, even though the organisations that these women worked for had such networks, the responses suggested that none of the women were really interested in participating. Partly because they did not want to position themselves as needing help.

Our research shows that, no matter how well intentioned, it is difficult to second guess the initiatives that would have the greatest impact in terms of increasing retention rates and diversity, long term. This is true for any under-represented group.

In the case of the women engineers in our study the message was clear. To encourage diversity and inclusion, senior management should listen to members of the minority groups that they wish to attract and retain, and take HR action based on what they learn.

Managers in STEM related professions, especially engineering, who want to promote better gender diversity, can start by considering the role of the micro-environment and focusing on the key factors that emerged from our study.

Dulini Fernando is Associate Professor of Human Resource Management at Warwick Business School.
E: Dulini.Fernando@wbs.ac.uk

Building a listening culture

Anna Barsby

Anna Barsby is Chief Technology Director at supermarket giant Morrisons after being named the UK's top Chief Information Officer by CIO magazine while CIO at Halfords. With more than 130,000 employees and 498 stores Barsby, who completed her MBA at WBS, is using her authentic leadership to push through an ambitious plan to improve Morrisons' digital capabilities.

How would you describe your style of leadership?
I would describe my style as genuine, people-centric and restless – I'm continuously looking for how to improve things and fast! I really believe in teamwork, so listening to customers and colleagues is fundamental to my approach.

I think I may be the only Art History graduate (Warwick) who is a CIO – not a traditional path, but I think my background helped me develop as a leader first and a technologist second.

What essential qualities does an effective leader possess?
At Morrisons, we have our 'Ways of Working' and the one that resonates with me most is 'Listening hard and responding quickly'. Creating a listening culture is vital for customers and colleagues – their insight is invaluable.

Being authentic is also important. An effective leader genuinely cares for others; their ambitions, their development and their welfare – it cannot be faked either.

They should be approachable and not be afraid to be seen as a 'real' human being with the same work/life balance issues as everyone else.

Share your story, tell people when you are leaving early for the school play. People follow people, so be the role model you wish you had had. The ability to see where you want to go, setting challenging but achievable goals and communicating them is also essential as a leader. Be clear and consistent.

In your career what have been the most valuable experiences in helping you develop as a leader?
I believe in watching and listening to those around me to see what works and, just as importantly, what doesn't.

I remember working for two very different leaders – one who was an extrovert and brilliant at engaging a room full of colleagues and another who was an introvert, great at engaging one-to-one but really didn't enjoy speaking to a larger audience. Both were excellent in their own way, but with very different styles.

I learnt that you don't have to fit into the mould of a typical leader. It's about being your own style of leader, being authentic and playing to your strengths.

I always do the things that make me uncomfortable as it's the best way to learn. For example, I remember having to go to Scotland to meet a different part of the team I was working with and as we hadn't particularly gelled on the phone, I didn't really fancy the trip.

But I learnt that face-to-face meetings are invaluable at creating relationships and ensuring that messages aren't misunderstood. Clearly nowadays, FaceTime and Hangouts can be used too, but it's a lesson I've carried with me – don't email if you can go and meet someone in person.

Self-awareness has also been key. I understand my own values, my strengths and those areas where I'm not best and need a colleagues' skillset for support.

I believe we should all develop our strengths and become great at them, rather than spending time on our development areas and only becoming average at these. I've always been good at seeing the bigger picture and helping others to engage with a vision, but I'm not as good at checking detail, so I have to ensure my team are set up to support me here!

How do you keep abreast of the fast-changing world of technology to see opportunities and threats coming?
I have set up a small innovation team who are my eyes and ears in the market. I also spend time listening to the advice and ideas of technology suppliers, start-ups and the more established players, and I keep up with the industry on social media.

I don't seem to have enough time at the moment to network with my peers, but I need to do this again soon. I find it hard to sit down and read long articles. If I have downtime I would rather pick up a novel or watch an architecture history documentary to escape the real world!

Who has influenced you in your career and how?
My mum influenced me in that she made it feel very normal for a woman to have a career. She has always supported me, especially in my role as a single mum. I am also heavily influenced by colleagues around me, coaching and guiding me. I'm not really someone who looks up to people I don't know - it just feels like my life and I'll do things my way.

My biggest influences, though, are my two daughters. They are the most important part of my life and I would do anything for them. I hope I'm showing them that it is possible to love your job, be a success (whatever that means to you) and earn enough to give you choices. That is what really matters to me.

What are the most important decisions you have to make and how do you make them?
In my role I have to keep our operation safe and our customers happy, by helping manage the availability of our food, keeping our tills operating etc. This is all while delivering projects and improving the business. It is critical to get the balance between all these things right and it can be tough.

In my life as a mum as well as a CIO, I really have to balance my busy work schedule. I take the girls to school twice a week, make the school plays and sports days etc. Managing my day-to-day, in and out of the office, is really important and it is also key that I support my colleagues as they work to manage their lives too. It also helps me build the resilience to keep it all working at once.

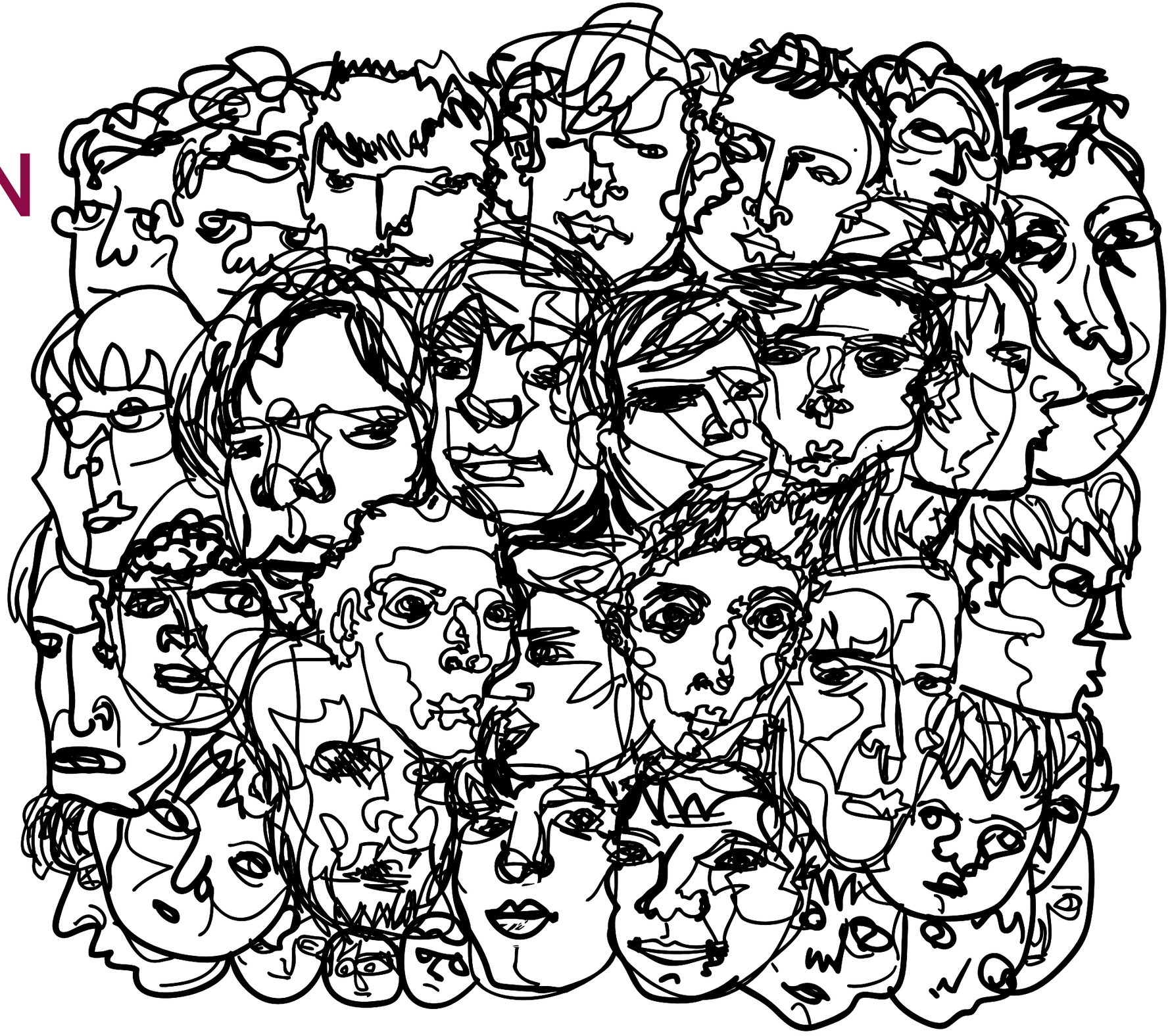
How do you make sure staff are able to learn from mistakes rather than be punished for them?
We are a very supportive team. Another one of Morrisons' ways of working is 'Freedom within a Framework', to give colleagues enough room to make things happen while providing a supportive environment with coaching and mentoring. Mistakes happen and we aim to learn from them.

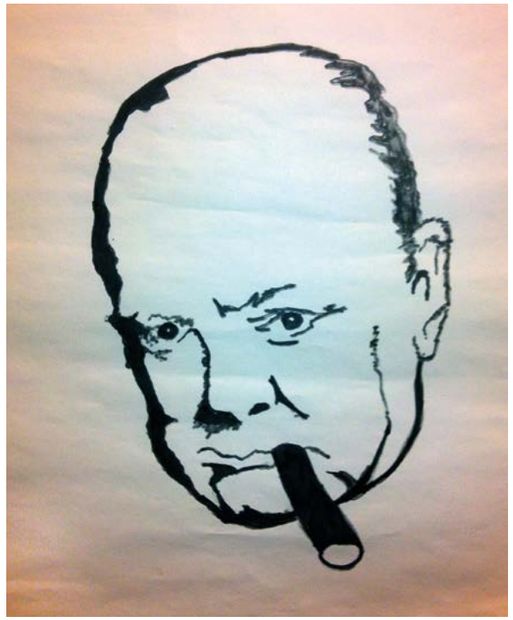
What piece of advice would you give to somebody aspiring to be in a leadership position?
My advice would be to do it your own way: be authentic, listen to your customers, learn from those around you, never stop learning and be restless. Mostly though, be present and enjoy the journey, if you wait until you are at the destination you will have missed so much.

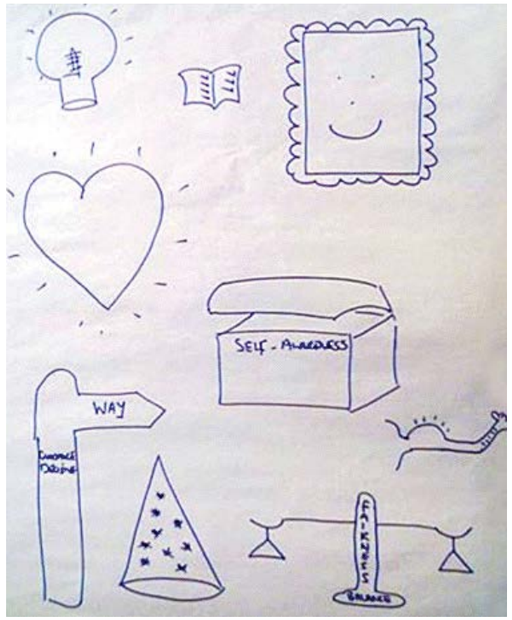
PICTURE AN EFFECTIVE LEADER. IT'S NOT ALWAYS WHAT YOU THINK.

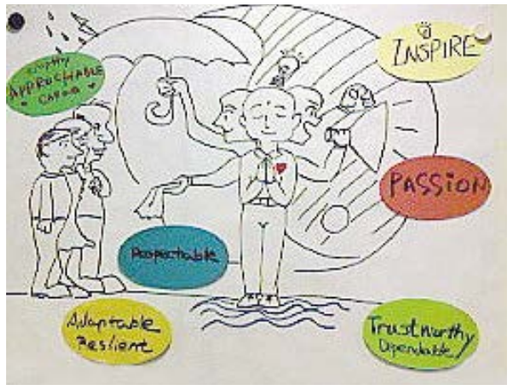
Asking people to draw a leader has revealed just how much leadership theory is based on cultural assumptions.

by **Tina Kiefer**









1. A drawing of Winston Churchill by a UK group of students
2. This North American group drew the typical symbols of a good leader
3. Latin students drew their leader in a boat full of followers
4. Asian students drew a leader with an umbrella to illustrate how leaders have a responsibility to look after the wider community in which their organisation belongs

How would **you** draw an effective leader?

Chances are you are picturing a person, most likely a male, featuring a number of different attributes describing the person's characteristics, skills and behaviours. If this is your image, then you have a lot in common with the majority of UK and North American executives and students that have participated in this exercise over the years – and, not coincidentally, with the mainstream textbook understanding of leadership.

But, your image may be very different. You may have pictured a tree or a ship navigating the high seas or an animal. And maybe, your picture even included followers?

I have collected hundreds of drawings over the past 15 years, with participants representing different cultures, professions and generations. In this exercise, participants are asked to first reflect on their personal experiences with an effective leader and then to discuss the nature of those leaders in groups. They are then asked to draw an effective leader that represents the group's view. The instruction is always the same, but the drawings produced can vary significantly.

Regardless of whether the groups' drawings correspond with an image of a person or capture an entirely different metaphor, many participants are surprised to learn that their image may not be as unique as they thought.

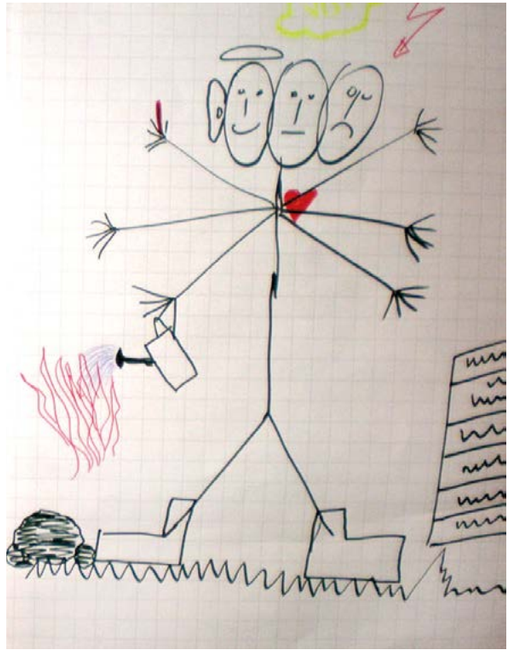
And participants are equally surprised about how very different those images can be, depending on the cultural or professional composition of the group. One explanation is that we tend not to be aware of how strongly our assumptions about leadership are rooted in our cultural values. And participants are not always prepared to readily accept other groups' representations of what effective leaders are. While the actual attributes are never questioned, participants have taken exception to the underlying message of the purpose of leadership and whom it serves.

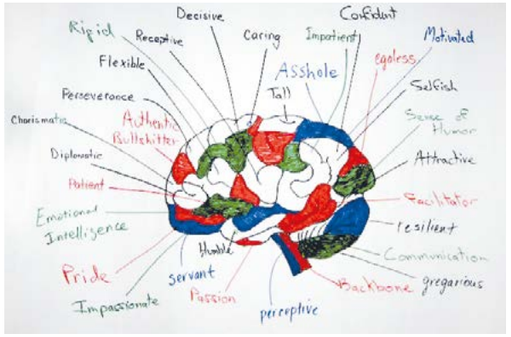
Apart from being a playful way to explore an age-old question, what do the drawings tell us? Asking people to draw an effective leader, rather than produce a list of bullet points, moves people away from textbook answers and taps into their implicit and cultural assumptions, revealing different beliefs and values attached to leadership, beyond the view that has permeated throughout much of the leadership research.

These drawings reveal who and what we believe effective leaders to be, their characteristics and typical behaviours. But for some cultures the drawings also depict how leaders are embedded in their leadership context and the role they play within the organisation and in society.

Drawings one and two are good examples of how the majority of US/UK drawings show an individual person, often a male, sometimes gender neutral, and only occasionally female (mainly drawn by an all-female group). The images contain personal characteristics and traits, represented by a range of symbols, such as a heart for passion or caring,

> "In some drawings it is hard to distinguish between the leaders and followers, with the role of followers seen as much more integral to an effective leader"





5. Nurses drew their leader as multi-faceted, with many roles that involved putting out fires as well
6. From the same hospital as the nurses, a group of consultants had a different idea what an effective leader is, with followers included and being a good listener
7. This US group used negative characteristics to illustrate what a good leader is
8. The tree is often drawn by Chinese and Far-East Asian students as they see the leader as part of a process where the organisation grows with resources flowing up and down to produce the fruit of their labour

ears for being a good listener, muscles for being strong, scales for justice or balance. While the majority of drawings only show positive characteristics, some acknowledge that leaders may need to be tough and display negative characteristics in order to be effective.

This view corresponds with the mainstream leadership literature, which is dominated by this idea that what makes effective leaders is inherent in the person, regardless of whether we follow a 'big man' (or 'big woman') theory or a transformational/transactional leadership, person-orientated or task-orientated leadership style approach. Ultimately, it is about personal attributes of a leader, and it is not surprising that followers rarely feature in those representations.

What catches the eye when comparing drawings from different backgrounds, is not only that some contain followers, while others do not, but the different ways in which followers are portrayed, ranging from subordinates to crucial players. While we often find similar leader characteristics (passion, vision, etc), the answer to the question 'what makes an effective leader' can also (at least partly) be followers and the way leaders and followers interact in a specific context.

In some drawings – such as number three – it is hard to distinguish between the leaders and followers, with the role of followers seen as much more integral to an effective leader. Those drawings may emphasise the role of leaders in relation to followers or even depict leaders within a wider societal function. The group that drew an umbrella in picture four, for example, explained how an effective leader also holds a vital function within society and how the organisational and societal functions are entwined, a message that one Western participant in the seminar took very strong offence to.

Moving even further away from the mainstream US/UK view of an effective leader, some drawings, often produced by Far-East Asian groups, do not depict people, but effective leaders as part of a process. The tree in drawing eight symbolises that the leader is part of an organisational process, with resources from the environment flowing up and down, growing and producing fruit (including a few bad apples). Drawings from Chinese public sector leaders explained that to understand effective leaders, we needed to understand their journey; from where they were born, how they were raised, their first job, their whole life story is inherent in their leadership.

Cultural representations of effective leaders are not limited to national culture, but tend to include different sub-cultural values and expectations between sectors, different professions or even within an organisation. Drawings from public sector participants in various countries demonstrate a more process-focused perspective, illustrating how leaders and followers have to work across boundaries to lead an organisation or department successfully. But different professional groups within the same organisation also tend to draw different representations of their effective leader – for example support staff, nurses or physicians within a hospital. Drawing five is drawn by nurses and six by physicians at the same hospital.

Following the thinking of Implicit Leadership Theories, we all hold lay theories of how ideal or real leaders are. Those lay theories, like other lay theories, guide our thinking, actions and decision-making, often without us being aware of it. For employees this means that on an everyday basis we are more likely to follow or "grant leadership" to those individuals who correspond with our implicit assumptions about effective leaders. For organisations or HR, it means that through selection, promotion and reward systems, the culturally determined and accepted version of an ideal leader will often sub-consciously be favoured, further establishing and cementing those cultural perceptions and preferences.

Why does it matter whether and how those drawings vary?

The flipside is that those individuals who do not visibly fit local and cultural assumptions, despite being capable of being effective leaders, will have a more difficult time as leaders. Not only will it be harder for those individuals to be promoted into leadership positions, but once there they are also less likely to be granted leadership and to be seen as successful in the role, affecting whether they will climb the ladder, get allocated high-status projects or get paid equally.

Because those values and assumptions are deeply rooted in society, they tend to continue to shape actions (sometimes even among those of us who pro-actively promote equality and diversity), making it harder for some leaders to succeed in some contexts.

But lay theories can be much subtler than that. Leaders with different styles or characteristics can be seen as effective in one particular culture but ineffective in another. This may appear obvious, but, while cultural differences are acknowledged in leadership theory and practice – for example in terms of different styles or gender differences – very little of the existing mainstream literature challenges its implicit assumptions.

To do so is important because much of the existing leadership theory and research is driven by a particular cultural view, which re-establishes its own implicit assumptions without being aware of it in writing, training or HR procedures. These drawings can open up the debate on not just what makes leaders successful, but more widely what leadership is perceived to be within a certain context. And the answer depends very much on the existing culture and its values.

Sheryl Sandberg (COO of Facebook) is famously quoted to have said: "We cannot change what we are unaware of, and once we are aware, we cannot help but change."

Hence, the drawings can help surface our values, beliefs and assumptions that implicitly guide our actions. This can help to break down traditional leader images, and make way for a different, more diverse pool of leaders who may approach the task with a fresh perceptive.

Tina Kiefer is Professor of Organisational Behaviour at Warwick Business School and consults organisations on change processes, focussing on emotional processes and psychological contracts.
E: Tina.Kiefer@wbs.ac.uk

SPEAKING UP FOR THE WHISTLEBLOWER

Society needs whistleblowers and organisations should be helping them step forward *by* **Marianna Fotaki**

In May 2018, Jes Staley, CEO of Barclays, the multinational investment bank and financial services firm, was fined by the Financial Conduct Authority and Prudential Regulation Authority for actions that risked undermining confidence in the company's whistleblowing procedures.

His behaviour fell short of "the standard of due skill, care and diligence expected". He also repaid a substantial part of his bonus, while Barclays was required to provide details of its whistleblowing procedures to regulators on an annual basis.

The incident showed that, despite measures taken by regulators in recent years, and the procedures adopted by organisations, implementing effective speak-up procedures remains a challenge for many organisations.

Over the last five years, together with research colleagues Kate Kenny and Wim Vandekerckhove, I have researched whistleblowing, studying its benefits, the plight of whistleblowers, the efficacy of speak-up processes and much more.

We have developed evidence-based guidelines and recommendations that senior managers, HR professionals, and compliance officers can use to design and implement effective speak-up arrangements.

The benefits of speaking-up

Whistleblowing is encouraged and protected in many jurisdictions because it is considered to be beneficial for organisations and society. Without protection, the fate of the whistleblower is, all too frequently, to be actively silenced, discouraged and vilified, suffering economically and ill-health.

Whistleblowers, in the main, are not narcissistic attention-seekers, betraying their colleagues. Instead, our research shows that they tend to be people who have a regulatory obligation to report, or feel a strong duty to the norms of their profession. They act out of a desire to stop wrongdoing and prevent it from recurring. And they do so, often, with great concern about whether their actions will harm their colleagues, or the image of the organisation that they want to protect.

As for organisations, they should not fear whistleblowers. There are many incentives for setting up robust whistleblowing procedures. For example, raising concerns helps to identify wrongdoing in organisations, something they seem to find difficult, even when wrongdoing is systemic. Nor is it sensible for organisations to signal that turning a blind eye to wrongdoing is appropriate behaviour. Tolerance of organisational wrongdoing and cover-ups can even translate into a mistrust of democratic and other important institutions.

And, if trouble is stored up over time, when wrongdoing finally comes to light the damage is often far greater than if it had been detected earlier. It can result in financial damage and falling share price, in addition to the costs of fixing the problem. Research shows that 40 per cent of 5,000 firms studied had suffered from serious economic crimes resulting in an average of more than $3 million each in losses. While the 2017–2018 Global Fraud and Risk Report by global risk consultants, Kroll, shows that insiders were the main perpetrators of fraud and whistleblowers, rather than internal audit or management, were the most effective means of uncovering fraud, exposing 47 per cent of fraud incidents.

Adopting robust procedures can help organisations avoid the reputational damage that accompanies a situation where a whistleblower feels compelled to take a matter public. It should also reduce the prospects of the whistleblower suffering damaging repercussions.

Some might argue that sufficient legislation and regulations are in place to protect whistleblowers in many countries. But evidence, including our own observations, suggests that legislation is failing to protect whistleblowers adequately and is not being translated into appropriate practices within organisations.

The barriers to adequate protection of whistleblowers are many. Senior managers complicit in or at least indifferent to wrongdoing, toxic organisational cultures, visibly poor treatment of whistleblowers, a lack of action or change after raising concerns - these are all deterrents to speaking up.

Organisations need to go beyond paying lip service to the notion of enabling and protecting whistleblowing and implement genuinely effective speaking up arrangements. In our paper *Designing and Implementing Effective Speak-up Arrangements* we set out 12 recommendations to help organisations do this. It is worth highlighting some of the key themes that underpin our recommendations.

Channels and access

It is important to provide easy access to speak-up arrangements. In practice, this means providing a range of different channels because trust in the process, built through familiarity and positive experiences, is likely to lead to changes in the channels that are used the most. These channels include, and this is not exhaustive, informal channels, email and web applications, internal and external hotlines, and independent external advice.

It is also important to make allowances for cultural factors. Our research suggests that culture affects the channels that employees prefer to use to voice concerns. For example, employees in the UK, US and Latin America were less willing to use an external ombudsperson to raise concerns than employees in Germany, the Middle East, and Asian countries.

Firms that ignore cultural differences, that try to standardise speak-up arrangements across territories, risk making the process more difficult to access for many employees. Another example of how firms can enable access to speak-up arrangements is by providing channels in multiple languages – at least in the local languages spoken by employees.

Responsiveness and feedback

Effective speak-up arrangements ensure that concerns are responded to in a timely and effective manner, where possible. Responsive speak-up arrangements build confidence and encourage more use by employees.

A responsive system is one that is well organised, clearly mandated, and adequately resourced. A good example of the kinds of problems that arise is the early dismissal of issues as grievances and more appropriate for HR to deal with.

However, what initially appear to be grievances may, on more thorough investigation, lead to details about serious wrongdoing. It is important, therefore, for organisations to be prepared to identify and respond to both grievance and wrongdoing related concerns.

Equally, organisations must be capable of dealing with an increase in the volume of concerns raised. That might be due to examples of whistleblowing and wrongdoing being publicised in the media, or changes in attitude towards certain types of behaviour in society such as less tolerance of wrongdoing and increased transparency thanks to social media and the internet.

Organisations should also be aware of possible barriers to responsiveness. Perceptions around responsiveness are especially important. For example, there may be legal

limitations to what can be communicated but organisations can take steps to manage expectations by explaining about legalities and providing indicative timescales for follow-up activities.

It may be difficult for organisations to be seen to be responding. Responses, such as sanctions taken against individuals, may lack visibility for a variety of reasons. Here, companies can create a generalised perception of a responsive organisation. They might, for example, where the matter is not a compliance issue, try to include the person who raised the concern in efforts to devise a solution. Organisations need to continuously stress to managers that responding to concerns is part of their role.

Providing this information in annual reports will demonstrate the company's responsiveness in dealing with concerns raised and commitment to protecting those who raise them.

Trust and transparency

There are several ways that organisations can help create the trust and transparency essential for effective speak-up arrangements. For example, including the HR function as well as compliance can encourage people to perceive speaking-up arrangements as being about well-being and engagement, not simply policing and compliance.

Even the act of implementing effective speak-up practices itself can build trust, or involving competent independent specialist speak-up operators and unions. Also, allowing employees who raise concerns to help develop solutions, where possible, can build trust.

Transparency, to the extent that it is possible without endangering the confidentiality and safety of whistleblowers, is also an essential aspect of building confidence. Actions that create transparency include recording speak-up events and including speak-up data in organisational reporting. Senior managers might, for example, publish aggregate numbers in the annual report and report performance against a best practice framework.

Speak-up champions

The recommendations we make in our paper are a great start for organisations determined to implement good practices around speak-up arrangements. However, although necessary, these measures are not sufficient alone to embed good practices systemically.

In the same way that business accepted the need for good CSR practices, we need leaders to step forward as speak-up champions, to set and maintain standards; to evidence the evaluation and process of speaking-up; to publicise the benefits of effective speak-up arrangements. And not just the obvious economic benefits, but also the benefits in terms of becoming a more attractive employer and building better stakeholder relationships, for example. Then, hopefully, other organisations will follow these pioneers.

Powerful signalling that policymakers and regulators understand the importance of whistleblowing and have the resolve necessary to encourage, enable, and protect, the practice of speaking up will also help. This will help create a society fit for the 21st century. A society where we can be confident that the vast majority of organisations are not only good places to work, but institutions that we can be proud of.

Further Reading:

Fotaki, M. Kenny, K., Vandekerckhove, W., Humantito, I. J., and Kaya, D. D. O., 2012. Designing and Implementing Effective Speak-up Arrangements. [pdf] Available at: wbs.ac.uk/go/speakup

Fotaki, M. Kenny, K., Vandekerckhove, W., Humantito, I. J., and Kaya, D. D. O., 2016. Effective Speak-up Arrangements for Whistleblowers. *Association of Chartered Certified Accountants*. [pdf] Available at: tinyurl.com/ya5mbsfo

Kenny, K., Vandekerckhove, W., and Fotaki, M., 2019. *The Whistleblowing Guide: Speak-up Arrangements, Challenges and Best Practices*. New Jersey: Wiley.

Marianna Fotaki is Professor of Business Ethics at Warwick Business School and a Senior Editor for Organisation Studies.
E: Marianna.Fotaki@wbs.ac.uk

SHARING IS DISRUPTING

FLAGGED – the rise of sharing platforms like Uber has led to protests and disputes in some cities, such as Chicago

The sharing economy trend is growing fast, but its big players are finding it hard to find a strategy that fits every country.

by **Pinar Ozcan**
& **Mareike Möhlmann**

There has been a 60 per cent increase in people using the sharing economy in the UK in the 18 months between January 2016 and July 2017, our survey revealed.

It is a phenomenal rise in the use of sharing platforms like Uber, Airbnb, TaskRabbit, JustPark and MealSharing, to name a few, and there is reason to believe this trend will carry on.

With the help of our colleague Chandy Krishnamorthy, our UK representative survey of 1,220 people found that 78 per cent of 18 to 24 year-olds have already used sharing platforms at least once before, providing evidence of how Millennials are eschewing possessions.

It points to a future where everything will be shared – cars, bikes, spare bedrooms, food, clothes even solar energy; possessions will be a luxury most people can do without.

Proponents of the sharing economy say it drives more efficient use of resources. A prime example are platforms like JustPark and Your Parking Space, which allow people to rent out their drive while they are at work and so reduce the burden on local authorities to build parking spaces. Similarly, renting out spare rooms is a more efficient use of space, allowing towns and cities to grow organically with less demand for new houses.

It can also reduce over-crowding in city centres. Studies show that Airbnb apartments are a lot more dispersed than traditional hotels, which are usually located in the centre of cities, so different parts of a city or town also become available to tourists, evening out income generation from tourism and boosting business opportunities in those areas.

It has also been argued that some sharing economy businesses allow people to access work more easily, for example becoming an Uber driver with other opportunities for people to further supplement their income through platforms like TaskRabbit.

Indeed, our survey found that 84 per cent of those earning under £40,000 per year said they used sharing platforms to save money and, for many, it has become a lifestyle choice with many using multiple platforms every month.

It shows the sharing economy is engrained in the lives of many people and it is not just those looking to make or save money, environmental concerns are another reason, particularly providers of services and for women. Interestingly, educated people are also more likely to use sharing economy services.

It all alludes to a booming new opportunity, with the evidence from our survey showing demand for sharing economy services is only going to grow.

At the same time, the arrival of sharing economy platforms has been met with plenty of resistance around the world, causing tensions, conflict, protests and costly court cases – as Uber can testify.

"Keep Chicago Uber. Join us in advocating for more economic opportunity, choice and competition – sign the petition today! Ask the Chicago City Council to reject Alderman Anthony Beale's anti-consumer plan."

This was one of the many emails sent to Uber customers around the world in 2016 to put pressure on local lawmakers to allow Uber to operate.

Similarly, consider the 6.2 magnitude earthquake on August 23, 2016, which completely destroyed several small villages in central Italy. Shortly after, Airbnb activated its disaster response programme that waived all service fees for hundreds of hosts in the region, making it easy to offer free shelter to disaster victims.

Such community-building initiatives helped Airbnb further legitimise and solidify its place in the hospitality sector.

Meanwhile, a woman in Egypt who rated an Uber driver poorly upon experiencing sexual harassment in the vehicle was contacted 30 minutes after the incident by Uber Egypt's head of operations, who apologised, explained the procedure Uber had taken with the driver, refunded her trip, and gave her extra ride credits. Within 72 hours this was the most shared story on Egyptian social media and Uber rides skyrocketed.

STRANDED – survivors of the earthquake in Italy in 2016 keep warm. Airbnb reacted by scrapping service fees for hundreds of hosts in the area

> The sharing economy is not just a fad, but well on its way to making a difference in society

The effective management of government regulations and public perception is no less important to organisational performance than business success in the marketplace.

Uber and Airbnb purposefully and strategically shape their institutional environment to improve their chances of success in different countries. However, while these strategies are effective in helping Uber and Airbnb legitimise their services and grow in these particular countries, it is unclear whether they work equally well in all country settings.

In a research paper with colleagues at Utrecht University one of the authors, Professor Ozcan, contrasted countries with well-developed and functioning infrastructural conditions, such as an efficient public transport system – as seen in the UK and Netherlands for example - to those with significant institutional voids, like Egypt, to find out how the country context influences the type and effectiveness of the strategies employed by Uber and Airbnb.

Let us first start with the striking success of Uber in Egypt. Would you expect in a country with only two per cent of the population carrying credit cards, poor transportation infrastructure and limited GPS coverage that a company like Uber would be successful?

If the company is able to tackle some of these societal challenges, then the answer is, yes. The findings show that Egypt has no established taxi stations or on-demand cab services, and some areas do not have access to public transportation at all. Combined with high unemployment rates, this provided Uber with the opportunity to address these problems and leverage the power it gained to transform institutions to their advantage.

An Egyptian parliament member told us that the most important challenge Uber addressed in Egypt was public safety and, in particular, the sexual harassment of women – 81 per cent of women report frequent harassment while using public transportation – unemployment and access to public transportation.

Furthermore, Uber is currently investing approximately $27.9 million to optimise the quality of the GPS system in Egypt.

Comparing Egypt to the Netherlands and the UK, the study discovered that, in developed countries, the legitimacy and commercial success of sharing economy firms has much less to do with their ability to solve grand societal problems and much more to do with how they approach existing institutions and key stakeholders in their environment.

For example, transformative strategies aimed at quickly changing the country's regulations and institutions, as Uber has used, can provide rapid gains. However, they are likely to backfire and lead to resistance from key stakeholders, such as regulators and incumbent firms.

In comparison, softer and more additive strategies, as used by Airbnb, allow for more opportunities to co-develop regulations that provide more sustainable legitimacy gains.

And yet there is a limit to applying additive institutional strategies. As firms grow over time, other non-market stakeholders – such as Amsterdam residents protesting at a housing shortage because so many landlords had put their apartments on Airbnb – may be affected negatively.

If firms do not adequately address such misalignments in their value proposition, they risk losing legitimacy.

Finally, the research found that despite acting locally and addressing the needs of the community to gain legitimatisation, market penetration largely depends on the approach of the national government regarding the regulation of the new service or product.

When governments play a more proactive role, as the UK is doing, politically active industry associations and lobbying various higher institutional actors, such as ministers, offer additional opportunities to gain legitimacy and influence regulation.

These institutional strategies also provide sharing economy firms with better opportunities to pre-empt or counter resistance by other stakeholders.

Overall, the quantitative and qualitative results from our various studies show that the sharing economy is not just a fad, but is well on its way to making a difference in society. This road is not free of obstacles, however, as obtaining the awareness and trust of citizens is not easy for sharing platforms, particularly when news about negative experiences are diffused so quickly in today's digital world.

As outlined above, sharing platforms need to keep up and adjust their strategy to their local environment to reach acceptance. Time will tell whether these platforms will get absorbed into existing industries with hotel chains offering homes as several recent acquisitions, such as AccorHotels' takeover of Onefinestay, have shown.

What is clear is that consumers will have more options to share rather than to own in the future, which, considering the overpopulation and global warming issues facing planet Earth, is certainly a good thing.

Pinar Ozcan is Associate Professor of Strategic Management at Warwick Business School and was selected for the Thinkers50 Radar list as a business thinker to watch.
E: Pinar.Ozcan@wbs.ac.uk

Mareike Möhlmann is Assistant Professor of Information Systems & Management at Warwick Business School and is a Visiting Assistant Professor at the London School of Economics.
E: Mareike.moehlmann@wbs.ac.uk

Keeping your partner in the dark

R&D partnerships are a great way of accelerating innovation, but they come with risks and the chance rivals will learn your secrets.

by **Jeff Reuer**

In industries where it is a race to the next innovation, partnerships in one form or another are highly attractive.

But in these industries, such as biotechnology, pharmaceutical or technology, forming collaborations is a risky business.

Knowledge can easily leak and not just to the partner firm. That's why many firms choose not to enter into partnerships or instead seek companies which are not direct rivals, sit outside their industry but have expertise and knowledge that can transfer, such as Microsoft and Toyota working together on cutting energy consumption.

But even when this is done, knowledge can still leak to your rivals, especially when you look at the location of your partner and the cluster of firms around it.

Most companies sit in clusters, surrounded by firms in the same industry, direct rivals even, such as banking with clusters in London and New York, or technology with its huge and famous cluster in Silicon Valley or around Cambridge University.

And policymakers, indeed economists, often see clusters as a good thing, helping the flow of knowledge in the industry. Clusters are sought after as, according to 'economies of agglomeration', more knowledge spills over the more firms are located together.

Moreover, the theory and supporting research suggests partnering with a firm in one of these clusters can help you benefit from that pool of knowledge. But that also brings competitive implications for your business, something firms should understand before entering a partnership.

Partnering with a firm in one of these clusters brings the risk of your secrets spreading to another rival, perhaps your biggest - just several doors away.

After all, people talk, especially at conferences, network gatherings, and social functions. These interactions are impossible to control and even worse, in the future your partner could join up with a rival because they are nearby or be acquired by one, with studies showing that geographic location increases the likelihood of both.

Also the risk of knowledge spilling over to nearby rivals increases as the partner is surrounded by more and stronger rivals of your firm.

So when partnering with a firm in a geographic location with a high density of firms from the same industry – ie a cluster – then that is an inherent risk. Information about your company's strategy and future direction, benchmarking data, and other vital statistics might become known and even key employees might be lured away once contractual details emerge.

Such 'indirect' knowledge leakages can also occur through venture capitalists, research has found. VCs want all their start-ups to succeed so sharing knowledge with them is an obvious ploy, but that may include a direct rival. Studies have also shown this can occur through board members as well, a partner's board member may have involvement with a rival directly or through their network.

The chain of connections to rivals should be something that is considered before entering a collaboration.

These risks may persuade your firm that a collaboration is not the right route, maybe an acquisition is the best option to not only bring that knowledge in-house, but move it from the cluster to your headquarters in a different location.

But if collaboration or a joint venture is the route you are taking, how do you stop valuable knowledge leaking?

We looked at 639 R&D alliances between 2007 and 2013 and formed by 114 US pharmaceutical firms and 481 US biotechnology ventures.

The US biotech industry is renowned for the concentration of similar firms in one location. Typically, it involves a large pharma company joining up with a smaller biotech firm, which is not focused on downstream activities like manufacturing, marketing or selling the final product in the market.

RISKY BUSINESS – your new R&D partner could be leaking secrets to neighbouring rivals

But choosing that smaller biotech firm has real risks attached to it when competing against another producer of a drug for the same disease in the same large US market, because they often sit in clusters.

We found there were four methods used to stop knowledge leaking:

1 An equity alliance

This is where the firm will invest a stake in the partnership. It can be done in several ways, through a minority investment in the partner or the formation of a joint venture. Out of the 639 partnerships we studied, 44 were equity alliances. The investment gives the firm a seat on the board to monitor and control the collaboration.

Being on the board might also give the firm voting rights and allows better monitoring of the partnership, so any unintended leakage of knowledge can be prevented.

The equity position could also give the firm preferred status if its partner was put up for sale, or the ability to block any acquisition by rivals or future alliances with rivals. More broadly, the shared financial stakes also help the firm to align incentives between each company.

2 Limiting the scope

You can tighten the number of activities and interactions between the two firms through a rigorous contractual agreement.

Some alliances not only work together on R&D, but then manufacturing and marketing of the project. There were 96 of these in our study and research suggests integrating these departments into the innovation process increases the quality of the new product and reduces the time it takes to get it to market.

But extending the scope to other departments also broadens the risk of knowledge leaking out, more information is shared between the two companies with more people involved, with operational routines also laid bare. Thus 595 alliances kept the scope to just R&D.

The more departments and people involved also makes writing a contract covering all eventualities even more difficult, with some rights and obligations bound to be missed in the complexity. This also means trying to monitor and keep tabs on what can and can't be shared becomes more costly.

So, if you are not going to use an equity alliance it is best that the project's scope is kept narrow, with fewer departments and people involved to reduce the risk of vital company secrets seeping out.

3 Reduce task interdependence

In an R&D alliance the more the project depends on knowledge being exchanged between the two firms the more risk there is of some parts of that knowledge ending up in the wrong hands, as increased interdependence requires closer working relationships.

But this risk can be reduced by working sequentially, so each firm works on the next stage of development independently. We found 295 firm alliances did this, while 344 worked reciprocally, where the project is handed back and forth between the partners to work on – this increases the risk of knowledge leaking.

The work can also be pooled into different units so, instead of working on each task of the project together, each firm works separately on different aspects, so knowledge doesn't have to be shared back and forth.

4 Steering Committees

If you are not using an equity alliance then you will need to draw up a contract setting out governance mechanisms, establishing accountability for different parts of the project, decision-making processes and outlining how to resolve disputes.

But another method is to set up a steering committee, with equal numbers of representatives from each partnering company on it. The committee is then given the authority to oversee the partnered activities.

Committees will also take up any disputes, which avoids the need for costly litigation or arbitration when disagreements occur in contractual arrangements. A steering committee can defuse these issues before resorting to expensive lawyers, which often ruptures the alliance indefinitely.

If there is a split over an issue, each partner can have the casting vote on different aspects of the partnership. Committees are very effective at reducing information barriers, but they are also used to regulate the flow of knowledge.

We have found when the two firms are working in the same technological area steering committees are often used as the formal channel through which documents, blueprints, test data and any other commercially sensitive information flows.

> "Partnerships are a great way to accelerate innovation and develop new ideas, but they can also jeopardise competitive advantage"

Instead of informal meetings being the channel where there is little oversight, a committee sets the ground rules of how information and knowledge is exchanged, giving both sides more control.

Partnerships are a great way to accelerate innovation and develop new ideas, but without adopting one of these methods they can also jeopardise its competitive advantage through unintended transfers of knowledge, particularly to competitors.

Jeff Reuer is Professor of Strategy at Warwick Business School and the Guggenheim Endowed Chair and Professor of Strategy and Entrepreneurship at the University of Colorado.
E: Jeffrey.Reuer@wbs.ac.uk

Further Reading:

Lioukas, C. S., Reuer, J. J. and Zollo, M., 2018. Choosing between safeguards: scope and governance decisions in R&D alliances. *Journal of Management.*

Devarakonda, S. and Reuer, J. J., 2017. Knowledge flows in R&D collaborations: the role of steering committees in managing misappropriation concerns in biotechnology alliances. *Strategic Management Journal.*

Reuer, J. J. and Devarakonda, R., 2017. Partner selection in R&D collaborations: effects of affiliations with venture capitalists. *Organization Science*, 28, 3, 574-595.

Devarakonda, S., McCann, B. and Reuer, J. J., 2017. Marshallian forces and governance externalities: location effects on contractual safeguards in R&D alliances. *Organization Science.*

How to make your firm more agile

In a world where uncertainty and the pace of change is increasing, companies have to become agile, but how do you turn an oil tanker quickly? *by* **Loizos Heracleous**

Agility has become de rigeur. Firms in all industries, from insurance and finance companies to aeroplane and vehicle manufacturers have agility programmes under way.

The problem, however, is that nobody seems to know exactly what agility is. In one sense, this is to be expected given agility's diverse roots. Agility burst on to the scene as a way to organise software programming efforts across teams in a flexible as well as efficient and scalable way.

A cornerstone document, the Agile Manifesto of 2001, then codified some of the principles these efforts employed, such as "people over processes and tools", "respond to change rather than follow a plan" and "working prototypes over excessive documentation". These principles may be good advice, but can also sound cryptic and nebulous to any executive pondering how agile their company is.

In my work with organisations including NASA's Johnson Space Center, I have developed an applied framework that can help to pin down agility for strategists and leaders.

From a strategic perspective, agility at its core, is the ability to adapt the organisation in accordance with external conditions. This involves the leadership capability to sense, judge and adjust accordingly, and to align activities with the strategic direction. The three key components in this view therefore are organisation, leadership and strategy. Each of these adds a necessary, but on its own insufficient, component to accomplishing agility. The three elements, when they work together, can help a company hit the bullseye of agility.

Agile leaders are not only those who can sense signals in the environment, but also those who seriously explore the implications of these signals and then orchestrate initiatives to drive the organisation forward. A host of organisational processes such as routines, established worldviews and sunk costs work against this process. From this perspective agile leaders are champions of questioning the established truths.

Elon Musk may be the archetype of an agile leader. His initiatives in space exploration, electronic vehicles and even tunnel-building are testament to his ability to read signals of what is needed, evaluate the implications and do what's needed, most often in novel ways to take things forward.

At a strategic level, agile companies are able to overcome inertia and adapt their business models as needed, balance speed and stability, and build inter-organisational networks to push forward learning and shape their environment.

IBM's shifts from a hardware producer to a solutions provider and currently to a "cognitive solutions and cloud platform provider" is one example.

At a strategic level agility does not have to be immediate, and indeed it cannot be for large corporations. It takes time to turn a tanker. Corporations need to make strategic-level changes in a planned, structured way for long-term, ongoing agility, while simultaneously making operational-level changes at greater speed as needed (an ambidextrous capability).

Finally, at the organisational level agility entails experimentation, learning, inter-functional collaboration, a re-allocation of resources to support emergent initiatives, as well as active unlearning of routines or values that are no longer relevant.

Alphabet (Google's parent) may be the archetype of an agile organisation. Many experiments are undertaken. Some fail (Google Glass, Dodgeball), some go on to create new multi-billion dollar markets (Google Search, Google Play), and some are still emerging, with immense promise (DeepMind, with all the adjacent offerings that artificial intelligence will enable). The organisation shuts down experiments that don't work and reallocates resources to those that do. At any time, many flowers are allowed to bloom, and some of those populate the valley.

Using the framework (below) a company can evaluate its agility levels and can pinpoint where it should focus its attention based on where the scores are lower. The framework can support strategic conversations about agility by asking the right questions and directing attention to capabilities that count.

All nine elements work as a jigsaw puzzle. Take one element out, and the potency of agility is diffused. The synergy across these components is what will give results. This framework boils down a number of ideas about agility to their essence, in a way that can help leaders evaluate their organisation's agility quotient and take action.

Agility practices	Score (1-6)
Leadership: Sensing environmental signals	
Leadership: Evaluating, engaging	
Leadership: Taking initiative, driving forward	
Leadership: Average score	
Organizational: Experimenting, learning, collaborating	
Organizational: Reallocating resources as needed	
Organizational: Actively reducing inertia (unlearning)	
Organizational: Average score	
Strategic: Adapting business model	
Strategic: Creating value through networks	
Strategic: Balancing speed and stability	
Strategic: Average score	
Average total score	

Loizos Heracleous is Professor of Strategy at Warwick Business School and co-editor of *Agility.X* (Cambridge University Press, 2018).
E: Loizos.Heracleous@wbs.ac.uk

FOUR TAKEAWAYS FROM KEEPING IT IN THE FAMILY

Family businesses might seem unfashionable in the era of VCs and angel investors, but they provide some useful lessons for companies driven by the quarterly report.

by **Christian Stadler**

At its height in the 1980s, more than 27 million Americans tuned in to watch the trials and travails of a fictional Texas oil family called the Ewings in the hit TV show Dallas. Clearly, family-run businesses can be rich with drama, but they can also provide lessons for other companies.

Despite the inherent risks associated with succession and non-business issues disrupting operations, family businesses remain a force to be reckoned with. In fact, 90 per cent of the world's companies are family firms. Many of them are mom-and-pop shops, but according to the Boston Consulting Group, 30 per cent of all companies with revenues above $1 billion are family businesses. This does not necessarily mean they own the company outright, but they at least hold a stake, which allows them to influence important decisions, such as the appointment of the CEO and chairman.

In the US, household names such as Wal-Mart, Ford and Sears are among them. Internationally, car giant Volkswagen in Germany, French luxury goods conglomerate LVMH, and India's Tata also come to mind. Besides the really big players, there are also hidden champions, who dominate niche markets. In Germany, they are seen as the main engine of growth.

The debate on how well family businesses perform is still ongoing. In a 2012 Harvard Business Review article, Nicolas Kachaner, George Stalk, and Alain Bloch argued that they outperform their peers in tough times, but under-perform when the economy is booming. This suggests that family firms are more resilient, an attractive feature as we currently face so much uncertainty in many economies.

To identify some useful lessons for non-family firms, I looked at the world's 100 largest family businesses, and relied on a database of 450 German companies that I built together with Kurt Matzler, Julia Hautz, and Viktoria Veider, all from the University of Innsbruck. Here are four lessons that all businesses can learn from:

1 Top management

How do you align the interest of shareholders and managers? In the 1990s, stock options became popular. The idea was that CEOs would benefit from the option when the stock price stayed above its strike price. In theory, that sounds great, but in practice, it led to a series of malpractices, such as options backdating and the manipulation of accounts, not to mention short-termism.

Family firms often avoid conflicts between managers and owners altogether by choosing a CEO who is a member of the family. But what happens if they have

selected an outsider as chief executive? They tend to stick to the one they appoint. While the average tenure of CEOs in large US companies is 4.6 years, those currently in charge of one of the 100 largest family businesses have already served 13 years on average. Their median tenure – perhaps a better indicator considering that in some exceptional cases family CEOs stay for several decades – is still seven years. The commitment to give a CEO sufficient time to implement his ideas creates a sort of loyalty that financial incentives cannot achieve.

In a study of companies which outperform the stockmarket for more than 50 years, I found that CEO tenure at successful companies was two years longer than at comparable companies. Historically, the tenure at top companies was 11 years, while more recently it has fallen to just under seven years. This matches the median tenure of CEOs in family firms.

No-one is born a CEO. Despite having similar jobs beforehand, nothing can fully prepare a person for the demands of the role. Judging a CEO after a short adjustment period is neither fair nor sensible. Only with the benefit of time are they able to truly develop their own agenda. Family firms get this right. Loyalty beats short-term performance.

2 Strategy

One of the most interesting features of family businesses is their strategic patience. Even when the chosen strategy does not deliver in the short-run, they tend to stick to it. This avoids confusion among staff and customers.

Take Hermès, a French luxury goods producer. In the 1970s, their focus on craftsmanship, top quality finishing, and exquisite materials seemed outdated. Still, Hermès resisted the temptation to change direction and start mass manufacturing products. It was prepared to fight fiercely for its way.

In 2010, for example, Hermès fended off a hostile takeover bid from LVMH as its leadership felt that this would force them to make compromises. In the long-run, this patience (you might also call it stubbornness) paid off. Customers are prepared to wait up to 10 years for some leather bags. Both revenues and operating incomes have grown steadily over the last decade – even during the financial crisis – while return on capital employed was 57 per cent in 2017.

While the Hermès story highlights the benefits of patience when an existing business model fails to deliver the desired results, the same approach is useful when a company tries to introduce a new business model.

Decaux, an outdoor advertiser, took a while to introduce the freemium model. The plan involved supplying cities with free street furniture, such as bus stops, in exchange for the rights to place ads on them. Although it was not an immediate winner, it eventually turned Decaux into the biggest player in its industry.

CEOs of non-family businesses are under a lot of pressure to hit the numbers every quarter. Unfortunately, this also increases the pressure to discard strategies that don't work immediately, but a glance at some of the most successful family businesses helps to illustrate why they should resist. Patience is a virtue when it comes to strategy.

3 Finances

Mega-mergers are back in fashion. But will family businesses participate? Probably not. Kachaner, Stalk and Bloch found that family businesses are substantially more conservative in regards to their finances than other companies.

Mergers are headline grabbing and exciting, but they also represent a substantial financial risk. On average, family firms only spend two per cent of their annual revenues on acquisitions, while others spend almost double, 3.7 per cent. Similarly, family firms carry less debt. Between 2001 and 2009, it accounted for 37 per cent of their capital, compared to 47 per cent for non-family firms.

It is pretty much the same when it comes to capital expenditure. Family firms are reluctant to spend more than they earn. Having longer institutional memories, they're more aware that downturns are unavoidable. And the best way to go through these periods is by building reserves in the good times.

For non-family firms, it is particularly challenging to remain conservative. They are under constant pressure to grow, but the best companies do not grow at the expense of their financial health. The top companies in my study on long-term success were substantially less leveraged than their comparison companies. In the 1920s, Siemens, for example, valued its assets in a much more conservative manner than AEG, allowing it to handle the Great Depression better.

4 Innovation

The reluctance of family businesses to engage in risky undertakings is also reflected in their innovation activities. In a study of German companies between 2000 and 2009, Matzler, Veider, Hautz and I found that family firms invest less in R&D than non-family firms. At the same time, they were better at exploiting their findings.

Three factors are at play here. First, family firms tend to stick to more narrowly defined niches. This is particularly true for Germany's mid-sized companies, such as Kärcher, a producer of high-pressure cleaners and window vacuum cleaners, or Ekato, which manufactures industrial mixers. In these niche markets, they combine technical expertise with customer knowledge.

Secondly, the frugality of family firms filters down into R&D. Researchers know they should concentrate only on ideas that can be implemented. Thirdly, most managers spend the best part of their career with the company. This gives them a better understanding of the business and hence an edge when they need to decide which ideas they want to invest in.

The family approach towards innovation has its benefits, but also comes with a downside: it is less likely to produce breakthrough innovations. Considering how high the failure rate is in implementing them, this seems a price worth paying.

The overall lesson is quite simple: be more conservative and stick with the people you chose. You might miss some of the upsides of more risk-embracing strategies, but if you want to still be in business a decade from now, family businesses show that playing safe is the way to go.

Christian Stadler is Professor of Strategic Management at Warwick Business School and the author of *Enduring Success: What we can learn from the history of outstanding corporations.*
E: Christian.Stadler@wbs.ac.uk

A previous version of this article appeared in Forbes.

8 tips on building a tech start-up

by Sophie Thompson

Sophie Thompson is Co-founder of VirtualSpeech and studied MSc International Business at Warwick Business School.

The idea for VirtualSpeech – a professional development platform that combines online courses with practice in virtual reality – came from our fear of public speaking.

My business partner, Dominic Barnard, and I hated doing public talks and thought VR could help us practice. So we built the app for fun, and put it on the app stores.

We had no intention of turning it into a business at first – we just thought practicing in VR would be a great way to get over our fear of public speaking, not realising that loads of other people have this fear as well.

VR is the perfect solution to get over this fear and practice in immersive environments that are as close to the real thing as you can get. We found a common problem and built a new and much better solution with VR.

From a VR app it has expanded into an online education platform with courses in public speaking, job interview preparation, business networking, B2B sales training, and more.

In just two years we have grown the idea and business model so we are now a profitable business, one of the few in the VR space able to say that. It has been hard work, with many lessons learned along the way. Here are my eight tips on setting up a digital business:

1 Tell the press

We were really lucky with our press coverage. We were first to market, and the press picked up on it. Some tech websites found us and reviewed the app, I think *The Next Web* were first, and then it snowballed from there and even *The New York Times* picked it up.

We didn't realise at the time how amazing it was to be in *The New York Times*. Everybody has asked us since 'how did you get an article in *The New York Times*?' But we didn't do anything!

That press coverage really helped, and we reached 100,000 downloads in a few months, which was unheard of in the VR industry at the time.

We quickly learnt the value of good press, so sending a press release to the media is something you should do straight away when launching your app or business, and even some local press coverage will really help.

2 Plan monetising from the start

Looking back, I think we should have started charging for the app from the start, even if it was just £1. After the stores take their cut, it still would have given us a good revenue base.

Once we put it on the stores for free, we couldn't change it and go back to charging. We experimented with in-app purchases, where people could unlock other rooms or scenes for a fee, but you can't charge that much because of the perceived low value of an app.

It also wasn't going to produce recurring revenue to give us a sustainable business model. We had the same problem with a subscription model too, because people would use it for a specific speaking event and then cancel their subscription.

We then pivoted to combining VR with online courses, to become an online communications training company. Now, consumers and businesses pay for online courses in communication, which are integrated with VR training and practice.

The thing with public speaking, and most communication skills, is that you are not going to get better unless you practice, so people can do the course and watch examples before going into the app to practice themselves.

The app gives users real-time voice analysis and they're able to view and track their progress for eye contact, speed, pitch, and other verbal skills. It's much more effective than just taking a course and waiting for a real speech or pitch to try out what you've learnt. With VR, there are no real-world consequences.

3 Innovate fast

Technology changes so fast and we have experimented a lot, but looking back, I would try more things out and try them quickly. It is better to know quickly whether they work or not, than wait for six months, and then try something else.

We have experimented not just with the VR and what services we offer, but also with the business model. We were told that a business should not straddle B2C and B2B, but we have found it works for us.

The B2C side provides our monthly recurring revenue that keeps us in profit each month, while our B2B customers are long-term projects that involve a lot of discussion, customisation and paperwork – the sales cycle is so long that we wouldn't have been in profit for the last year if we had concentrated solely on B2B.

4 Do content marketing

We've tried Google ads and Facebook ads, but most of our leads have been inbound thanks to content marketing and writing high quality blogs. Since we started writing blogs we have had a 35 per cent increase in website traffic each month. We have been really focusing on our SEO and we do blogs all the time, so much so that we have now employed somebody to specifically write blogs for us.

We are on social media, but I don't know how useful it is for us as not many people are going to sign up to a paid course straight away.

I've read that you have to make six touch points before people buy a purchase of that value.

That's why remarketing has been our most effective strategy on Facebook – it adds another touch point. But really, companies are finding us because of our SEO, so we haven't had to do any hard selling.

5 Apply to incubators

We were lucky in that we were asked to apply for Boost VC's start-up acceleration programme in Silicon Valley after they discovered our app.

However, you should definitely actively look for incubators to apply to. It really benefited us and helped us become a business rather than a side project – it was at Boost VC that we experimented with our pricing models.

I have done an MSc International Business, which gave me general business acumen and strategic insight after my Theology degree, and I worked at a social media agency for a bit.

Our time at the incubator, however, really added practical knowledge; we learned a lot from the other start-ups and mentors, and gained valuable insight into how the whole start-up process works, the funding rounds, what VCs are looking for, and how to be a successful entrepreneur.

6 Rounds of investment funding are not the only route

After getting some funding from Boost VC and Innovate UK, we decided not to raise a formal round of funding. This was partly because raising a round is like a full-time job in itself – it takes a lot of time and resources, and we don't have the people capacity to do that.

A lot of investors we spoke to were also based in the US and wanted us to move there, but it costs a lot more to hire engineers there than over here in the UK.

You also have to give up part of your company in return for investment and we wanted to retain complete control over our direction.

We decided to grow organically and aim to make a profit as quickly as possible – if you raise £1 million, you find ways of spending it and two years later you could still not be making a profit, and we didn't want that. We're focused on revenue and building a sustainable business model and, at the moment, we're one of the few revenue-positive VR companies.

7 Keep costs low

With the wonders of the internet you don't need all your employees to be in the same place or to pay for a big, fancy office space.

I live in Warwickshire, but my business partner Dom is in London. I am moving to London, because that is where the tech scene is in the UK, but Dom is then going to Amsterdam for a few months.

He does all the coding and engineering, while I work on the more customer-facing side of things - marketing, sales, and strategy.

We employ two other engineers, one in Russia and one in London, while our content writer is also in London.

We all communicate a lot through Skype and Google hangouts so everyone is kept up to date.

8 Know your worth

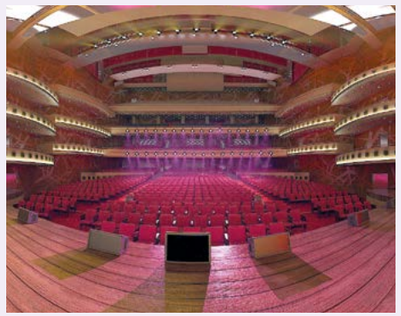
Do not be afraid to say no. Once you've set your price, stick to it. People always try to cut it down and when you're starting out and you just want your first customers, it's so tempting to charge peanuts just to get them to use your product.

But at Boost VC they often reminded us to never undersell yourself – whatever you are thinking of charging then add a bit more because start-ups often undervalue what they're selling.

Pricing is difficult with a new technology because there is nothing to compare it to and trying to get research on the VR sector is very difficult.

You need to be confident in every aspect of being a founder as, in tech, the chances are that what you are doing is very new, so it is your job to convince people why it works and it is worth investing in.

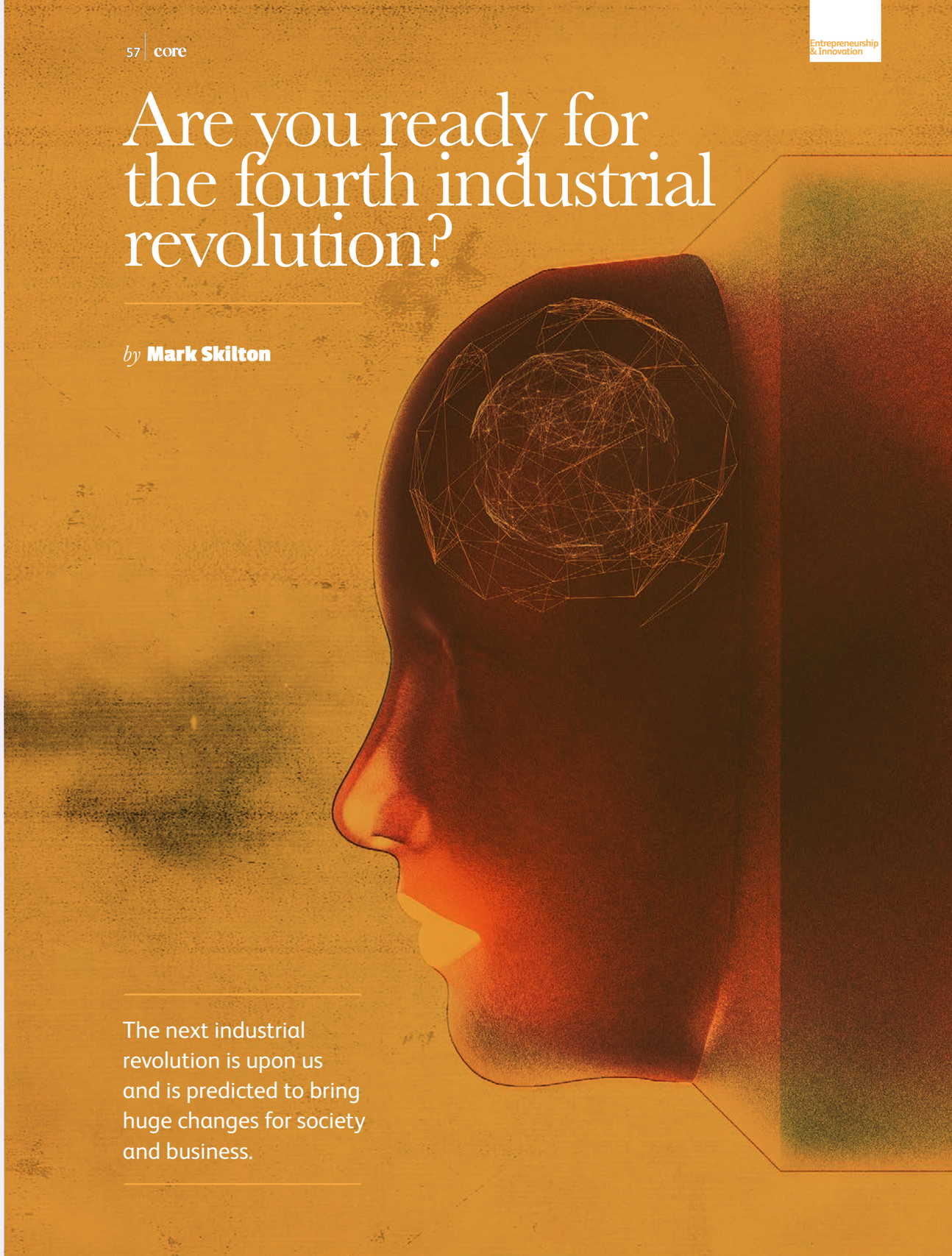
If you are not confident in your product, they aren't going to be. As a 24-year-old woman, I often have meetings with 50-year-old men in suits, and two years ago when we first started, that was really intimidating for me - but you have to be confident and believe in your product, or nobody else will.



PRACTICE MAKES PERFECT – inside VirtualSpeech's VR app where students can practice public speaking and are given feedback on their performance

Are you ready for the fourth industrial revolution?

by **Mark Skilton**



The next industrial revolution is upon us and is predicted to bring huge changes for society and business.

> We are fortunate to live in such exciting times, but the opportunities also carry threats – even for the winners.

We take for granted many of the technological advances of recent years. We listen to music streaming on our wireless devices with barely a second thought.

We Skype or FaceTime family, friends and colleagues thousands of miles away with devices that fit comfortably into our pockets. We barely raise an eyebrow when our favourite stores target us with offers that seem telepathic in their accuracy.

Yet all of these activities are marvels of connectivity and automation requiring multiple networks and technologies. Streaming music, for example, relies on Wi-Fi to the local home network that passes through an internet gateway through the Internet Service Provider (ISP) and to the music streaming service hosted on the subscribed service cloud datacentre. The return connection passes from the mobile phone to the Bluetooth device in milliseconds.

In the background, the smartphone is also managing its battery energy through algorithms that make localised decisions to optimise battery life and update GPS location tracking. And on and on it goes.

If we choose to move to another room or building, the connection automatically switches to an available mobile cellular connection service provider and the music continues uninterrupted. All the while the mobile application is making recommendations alongside each music track, suggesting alternative artists to suit the listener's musical tastes, using matching techniques that rely on so-called machine learning.

This is just a tiny example of what machines are now capable of. Machine learning is the term on everyone's lips at the moment (along with its close relative Artificial Intelligence). So what is machine learning and why is everyone getting so animated about it? Machine learning is a field of computer science that uses statistical techniques to provide feedback loops that give computer systems the ability to progressively improve their performance of a given task – in other words to effectively "learn" over time. This has huge implications for other technologies too.

Inventions previously only imagined in science fiction, such as virtual and augmented reality, 3D printing, robotics, blockchain, quantum computing, nanotechnology and bioengineering are now a reality – changing how materials, money, products and services are made, exchanged and consumed.

The World Economic Forum (WEF) has named these technologies collectively as the fourth industrial revolution because they represent a new paradigm, changing productivity through automation.

WEF founder Klaus Schwab described it as a culmination of emerging technologies, arguing that this revolution is different in scale, scope and complexity from any that have come before.

It is characterised by a range of new technologies that are integrating the physical, digital and biological worlds, affecting all disciplines, economies, industries and governments, and even challenging ideas about what it means to be human.

Already, they are changing how we live, work and consume through new industry processes, smart cities, connected homes, driverless cars, wearable devices, and new approaches to healthcare. In the future, they will disrupt and reinvent business, jobs and every other aspect of our lives.

So how can you position your business to survive and thrive in this brave new world? There are four key lessons:

1 Long time coming

The first thing to say is that the concept of the thinking machine is not new – its origins can be traced all the way back to the Second World War and the likes of Alan Turing, deciphering the Enigma code at Bletchley Park (most of the new technologies of the fourth industrial revolution are hidden in plain view if you know where to look).

The term machine learning was coined by Arthur Samuel as long ago as 1959, and evolved from pattern recognition combined with AI.

Machine learning uses algorithms that can learn from and make predictions based on data and is now used in a growing number of applications – everything from predicting what you might want to buy from Amazon to using facial identification to screen for terrorists at airports or hooligans at football matches. It is the ability to improve performance rapidly – and process data much faster than the human brain – that excites the techies.

But the world didn't change over night: many of the breakthrough technologies that underpin the fourth industrial revolution have origins that can be traced back through several evolutionary steps before moving into the mainstream. The big difference now is that these technologies have reached critical mass. They are acting in unison.

2 Commercial fusion

It is important to take a holistic view. Machine learning should not be seen in isolation. It is not the only show in town. A cluster of new (and not so new) technologies is entering the mainstream at the same time. These include: cloud computing multisided platforms, the Internet of Things (IoT), virtual and augmented reality, blockchain, and nanotechnology, to name but a few. What we are witnessing is the coming together of these technologies.

The technological and commercial planets are now aligned. It is the 'fusion' of the physical, digital, and biological – through the integration of existing technologies that is powering the new revolution. The companies that win will be the ones that integrate them most imaginatively and effectively.

For example, 3D printing, also called additive manufacturing, represents a new digital to physical fusion of technology, printing and materials design and fabrication.

It originated from stereolithography dating back to 1986. The speed and choice of materials are increasing rapidly to a stage where 3D printing machinery is now embedded into mainstream flexible and reconfigurable manufacturing processes, including General Electric printing jet engine parts and medical breakthroughs for human tissues.

Biological fusion is also coming of age. Miniaturised IoT sensors can be attached to the human body, ingested or integrated with organs, enabling biological monitoring and augmentation.

These devices now play a vital role in mHealth and eHealth solutions, including mobile monitoring and measurement of medical and wellbeing status. Biological fusion also includes plant, animal and biosphere monitoring used in automated agriculture and hydroponics.

3 Think big, but also think small

The revolution is at the macro and micro levels. There's been a lot of talk about big data and the ability of machines to crunch huge amounts of data. When coupled with supercomputers, this treasure trove of data will provide unprecedented 'big picture' insights.

But the fourth paradigm is just as much about 'small data' – personalised information about an individual, and the ability to conduct commerce on a one-to-one basis.

Today, for example, the combination of cloud computing and digital platforming strategies, such as the multi-sided platforms (MSPs) that can service multiple markets and customer sizes, as well as facility sharing and co-selling of the platform, is changing the face of business.

Commerce is being democratised through a multitude of platforms, from eBay and Alibaba, to Uber, PayPal and Stripe, and social media platforms like Facebook and Twitter. Even small community platforms are getting in on the act, enabling the residents of a small town or village to buy and sell goods and services virtually.

This is the shift to the so-called 'gig-economy', which relies on massive networked marketplace infrastructure for exchange, collaboration and trading.

It is now possible to conduct business one-to-one with individuals on the other side of the world without the requirement of an international company or bank. Fuelling this market are ubiquitous technologies such as smartphones and apps that allow a readily available platform for on-demand with pay-as-you-go services.

4 New questions

The final point to realise is that the fourth industrial revolution doesn't only pose technological conundrums; it asks new questions about how we manage our organisations and communities – and society as a whole.

The new kinds of automation made possible by advances in AI and the other technologies require a re-evaluation of leadership and new ways of thinking.

The opportunities made possible by the fourth industrial revolution are as infinite as the human imagination. We are fortunate to live in such exciting times, but the opportunities also carry threats – even for the winners.

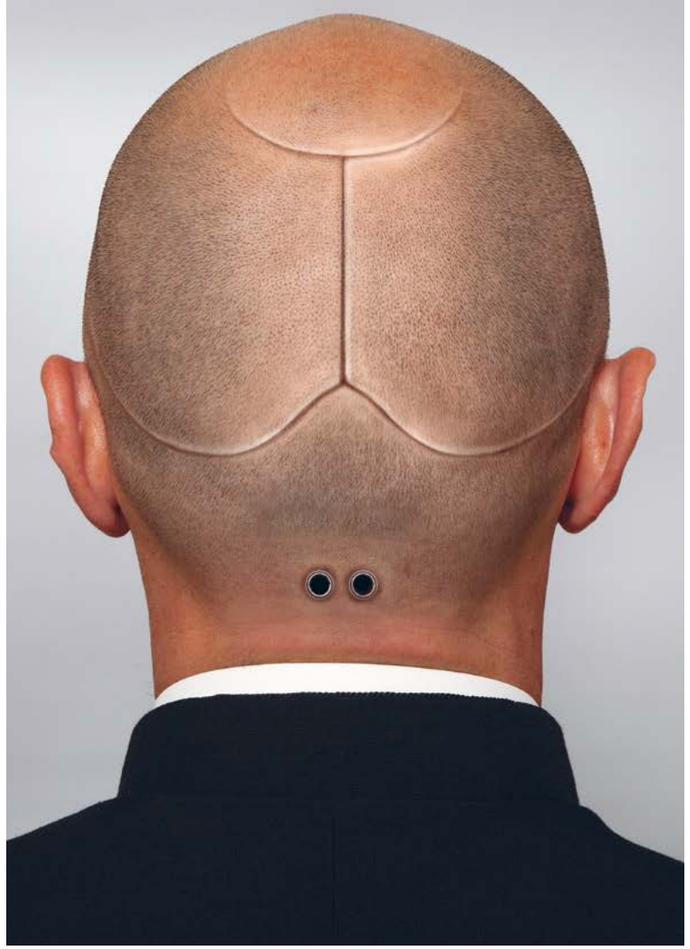
Concerns about cybersecurity have become a major crosscutting feature of fourth industrial era technology and will continue to be. And we are only just beginning to consider the ethical dilemmas new technologies pose for issues such as privacy, public safety, genetic engineering, jobs, incomes and inequality.

The leaders of Facebook, Uber, Google and Tesla have all found themselves in the dock of public opinion lately, answering questions about everything from the use of personal data, to fatalities caused by driverless cars. They will not be the last business leaders to feel the heat from the fourth industrial revolution.

Mark Skilton is Professor of Practice of Information Systems & Management at Warwick Business School and is Industry Director of the AI Innovation Network.
E: Mark.Skilton@wbs.ac.uk

PREPARING FOR THE RISE OF THE ROBOTS

As the fourth industrial revolution emerges **Maja Korica** argues companies must help society prepare for the impact.



Core: Automation has been here for a while. Why do you think it is a particularly important issue now?

Korica: What is perhaps most concerning is the speed at which the biggest players are now introducing these changes. If you take a company like Amazon, for instance, in 2017 it introduced more than 50,000 new robots, a 100 per cent increase from the previous year. Estimates suggest some 20 per cent of its workforce may already be robots. This shift is highly visible and, of course, highly effective. After all, robots can work 24/7, 365 days a year, they do not have unions, they do not complain, there are less costs associated in terms of providing an acceptable working environment, they come with great efficiencies. They present a powerful incentive for other firms to do the same. Whether it's AI or robots, there may be humans involved still, but fewer and fewer. And this is not just in Western economies. In China, for instance, the scale of investment in robots, and displacement of workers, is huge.

C: Won't other jobs be created to make up the losses – that is what has always happened before?

K: That is the traditional doctrine. However, some of the traditionally better paid jobs, like lawyers, surgeons and financial advisers, are now a target for automation too.

C: So is this a new paradigm – different from technology advances that have eradicated jobs in the past?

K: I am relatively convinced that it is. It used to be the case that with new technological advances came new opportunities, and often better, and better paid work. That is no longer necessarily the case, and this has significant consequences. Not just in terms of economics, because of reduced purchasing power spread across fewer people, but also in terms of social and political consequences. What happens when millions of people discover they no longer have long-term careers, or a stable job at all?

C: However, lower headcount, lower costs, greater productivity, equals more profits. That's a positive for shareholders.

K: Well, if you are just looking at the bottom line, then you are absolutely right. Cutting workers is one obvious solution. The robots pay for themselves in a short time, so the investors might expect to do very well.

The problem is that calculation is no longer appropriate for the modern world. You can fly under the radar and hope for the best, but already we can see some of these things having well-publicised broader social and political consequences. National publics are increasingly living those consequences, so losing patience with this type of thinking. It is clear that here investor interest doesn't match the interest of the public, nor of national governments, certainly not in the longer term.

C: What are some of the suggested solutions to this challenge?

K: There are a few. One that I have researched and written about is the 'robot tax'. The idea is to use tax as a disincentive for automation or, more realistically, as a redistribution mechanism of corporate gains from automation. Of course, some policy-makers and business leaders object it is a levy against progress. Here, the argument goes that technological advances are inevitable and essential, so we need to avoid any kind of tax that would make business less likely to invest in AI and robots. There is also the fear that nations would be at a competitive disadvantage if they levied such a tax.

C: But if we accede to the 'don't tax progress' argument then we bow to the inevitability of ever greater wealth inequality?

K: Well, the capturing of wealth created by automation has been clearly shown to go almost entirely to business owners in recent years, certainly in countries like the UK and US. And it is not really being redistributed. Not to employees through increased employee ownership options, for example, nor more broadly. For many average workers in such countries, their wages have stagnated or fallen over time. Whole communities struggle to find work. Social structures begin to buckle, especially if, at the same, time governments have less tax income or political desire to provide safety nets for displaced workers.

While the benefits of automation are clearly accumulated by business owners, the negative social and economic consequences presently fall on local communities and society more broadly.

C: How then do you make a robot tax, or something similar, palatable to business? How do you reconcile these competing interests?

K: The only counterpoint to those kinds of incentive structures, which are very self-interested, is targeted work at a pan-national level, based on a shared set of principles concerning the social contract. The EU, for example, can take collective action if there is enough political will.

In the absence of this, expecting companies to be responsible is basically saying "whatever you are happy to do, you can do". Self-regulation may work in some cases, but given the powerful incentives to introduce robots, it is highly unlikely that they would choose not to adopt these technologies.

They might, of course, raise the salaries of the people that remain, but this would still have limited impact more broadly. In short, governments play a key part in mitigating those effects, and working out solutions.

C: Without intervention, the scenario you describe is one of an increasingly fractured world, as shareholders become considerably wealthier, while the majority of people struggle to earn a reasonable salary or find work?

K: Absolutely. This fracturing speaks to the wider world we find ourselves in. As such, what I believe policymakers and business leaders should be thinking about is how do we collaborate across organisational boundaries to deal with these so-called 'wicked problems'. These happen in environments where we are resource-stretched, where political winds aren't in our favour, when we are under constant media scrutiny, when timelines are incredibly tight, when best solutions aren't immediately obvious, or practically possible without collaboration.

The idea that, as a company, you can forget about other people, that as an entity you have fixed boundaries, and can, therefore, choose to engage in the world however you want on your own terms. That notion is crumbling before our eyes. Sitting on the sidelines is no longer an option.

C: What are the barriers to the kind of co-operation you think is needed?

K: It has not always been this way. For instance, the so-called titans of business historically played a great role in public life in the US, based on the sentiment that we are all living together in this society, and so need to take some responsibility for what happens in our backyard. Today, however, for many large multinationals, there is less sense of belonging: they are everywhere and nowhere. Their boundaries are so porous, they don't even know who their employees are, who or what they are responsible for, where they start or end. And there is also a much greater, detrimental focus on the bottom line in the short term.

C: So organisations need a different approach?

K: Yes. We need a stewardship model, where leaders and organisations are contributors to broader well-being. For a CEO, this shift means practical reorientations too. CEOs should be thinking whether their staff at all levels can meet this challenge – do they have the skills that allow them to work with others across boundaries to deal with 'wicked problems'? In a world where AI, machine learning, and robots are prevalent, organisations will still need people who can exercise sound judgement within increasingly challenging environments. Do your staff have the capacity to create imaginative realities for different futures? Do they have the means to break through the ceiling of information that surrounds every executive without reducing complexity? Are they continually asking critical questions?

C: So to go back to the robot tax, that sounds like a bit of a temporary patch? These types of measure are merely a prelude to a fundamental rethinking of what a company and corporate model should look like?

K: Absolutely. For me, the question is who owns the gains and the losses? We need to train people to face a different kind of reality or for a future with less work. How are we going to do that and who pays? And even if we figure out the payment element, what does this mean for individual identity and meaning? We talk about dignity of labour. Today's work is already short on dignity for many. What happens if we lose the labour part too? What will we do? Who will we be? These are some of the fundamental questions we need to answer and pretty soon too.

Maja Korica is Associate Professor of Organisation and Human Resource Management at Warwick Business School and was shortlisted for the 2017 Thinkers50 Radar Award.
E: Maja.Korica@wbs.ac.uk

Four ways entrepreneurs cope with the fear of failure

Entrepreneurs aren't fearless, they learn to live with fear with it being an inhibitor and a motivator.

by **Gabriella Cacciotti & James Hayton**

Failure stalks the world of the entrepreneur. For them failure and the fear of failure are facts of life – whether it be losing a client, not being paid, an inability to deliver on schedule, out of control cash flow, or not spending enough time with their family.

For them courage is not the absence of fear, but the ability to take action to achieve a worthy goal in spite of the presence of fear.

We asked Hamdi Ulukaya, the Turkish-born founder and CEO of yoghurt company Chobani, whether he was ever afraid while building his multibillion-dollar business.

"Every day," he replied. "The worry got bigger and bigger as people increasingly relied on the company making their future decisions. Because if I had failed, a lot of lives were going to be affected by it."

Entrepreneurs plunge into uncertainty. The American Bureau of Labor Statistics charted the failure rates of businesses that began life between 1995 and 2015. After the first year, 21.2 per cent had failed; after two years, 32.1 per cent; after five years, 51.2 per cent; and after 10 years, 79.6 per cent.

Research by Shikhar Ghosh, of Harvard Business School, found that 75 per cent of venture-based start-ups fail.

Reed Hastings, chairman and CEO of Netflix, reflected: "As an entrepreneur you have to feel like you can jump out of an aeroplane because you're confident that you'll catch a bird flying by. It's an act of stupidity, and most entrepreneurs go splat because the bird doesn't come by, but a few times it does."

Hastings' first entrepreneurial venture was Pure Software. At one point he actually asked the board of the company to replace him as CEO. They refused. He went on to be co-founder of Netflix, a business which he began with no idea whether customers would buy what it was offering or not.

Entrepreneurs have a paradoxical and complicated relationship with failure. On one hand, they are frequently advised that failure is a good thing. Business legend is replete with stories of entrepreneurs whose ideas failed and then failed again until one day they became a success. Fail fast and often is the constant refrain of the lean start-up movement and many others.

And yet, fear of failure is natural. Nobody really wants to fail. Failure has many ramifications which it would be foolish to overlook or downplay – potential bankruptcy, re-possession of your home, social stigma, the loss of people's livelihoods and more. This is a constant in the life of any business.

Fear of failure is usually identified as an inhibitor to people starting a business. The inhibiting force of the fear of failure has been a dominant focus in research. Of course, fear does inhibit start-up activity, but that does not mean that only the fearless actually become entrepreneurs.

Our research shows that fear of failure remains omnipresent as a new business develops. There is no escape. This is the paradox of the fear of failure: it can inhibit and motivate. Rather than simply stopping people from being entrepreneurial, fear of failure can also motivate greater striving for success; you are always nearer by not keeping still.

To better understand the relationship of entrepreneurs with failure, we interviewed 65 of them in the UK and Canada. Some had established businesses, others were in the early stages of developing their business.

We define fear of failure as a temporary cognitive and emotional reaction to environmental stimuli seen as threats to potential achievement. Fear of failure is a state rather than a trait. Rather than a characteristic that some people have, and others do not, fear of failure is an experience that is widely shared but dealt with in different ways.

Entrepreneurs are not distinguished from non-entrepreneurs by an absence of fear. What we found was that the relationship which entrepreneurs have with failure is much more complex than that portrayed by success stories. Failure and the fear of failure is nuanced and multi-faceted.

The research identified seven sources of fear. These were repeatedly raised by the 65 entrepreneurs and have been validated by further research:

- Financial security
- Ability to fund the venture
- Personal ability/self-esteem
- Potential of the idea
- Threats to social esteem
- The venture's ability to execute
- Opportunity costs

Not all fears are created equal. The source of the fear is important. Our research found a positive association between the worries concerning opportunity costs and an entrepreneur's persistence in pursuing their goals.

In other words, when entrepreneurs contemplated the choice they had made in pursuing their venture and how this necessitated missing out on other opportunities, whether in their professional or personal lives, they were more motivated to carry on with the venture.

In contrast, when entrepreneurs worried about either the potential of their idea, or their personal ability to develop a successful venture, then they tended to be affected more negatively. They became less proactive. The fear of failure leads to fight, flight or freeze behaviours.

"It just makes me more aggressive to get this thing going as fast as I can," one interviewee commented. Such defiance conforms to the entrepreneur as hero stereotype. It is the definition of courage: taking action in the face of fear.

For others, fear of failure has an impact on how people engage with tasks and how they make decisions.

"Instead of being on the phone trying to get a customer, you are sitting there talking about why we need to call more customers or why we don't call customers anymore, why we should start emailing them. So, you are talking about it and not doing it," one entrepreneur confessed.

Procrastination can become commonplace. Numbers are crunched remorselessly resulting in paralysis through analysis. Decision-making is slowed down as all possible data is sought and the avoidance of making a wrong decision becomes the primary driver. In other ventures, a fixation on specific threats becomes the sole focus, creating target-fixation where that one thing matters and only that one thing.

Experiencing the fear of failure can change the nature of goals that entrepreneurs set for themselves. Where fear of failure is greater, they may select either easier, more readily achievable objectives, or wildly impossible goals.

Ironically, selecting impossible goals allows us to more easily rationalise our failure to achieve them. Either way, fear has the effect of undermining effective personal goal-setting, one of the most valuable self-management tools that entrepreneurs have available to them.

A further outcome we heard from entrepreneurs was the tendency to escalate commitment to specific goals, at the expense of other activities and sometimes in the face of evidence that a path should be abandoned. Once a path had been chosen, negative feedback could actually lead to increasing investments in what otherwise might be considered losing strategies.

So, how can and should entrepreneurs respond to the fear of failure? Our research revealed four key strategies that enable entrepreneurs to ensure fear of failure works positively:

1 Emotional self-monitoring and control

Author JK Rowling was rejected multiple times before the Harry Potter series was signed up by Bloomsbury. She has described this as a process of "stripping away of the inessential". It enabled her to focus on what mattered. She said: "I was set free, because my greatest fear had been realised."

Emotional intelligence involves not only having the awareness of one's emotional states, but also being able to control the influence of those states upon thought and behaviour. Some of our entrepreneurs were highly emotionally self-aware.

"If I'm in a lower mood one week and I look at my projects I see only negative things and reasons why it can't happen," said one entrepreneur. "I started to learn that that's actually not associated with the projects but it's associated with my emotions."

Another said: "I've actually recently been learning to separate that anxiety out because I've learnt that it's just transient."

Entrepreneurs may wish to adopt tools from sports psychology to cope with the fear of failure. In terms of winning gold medals, British Cycling has become the most successful sporting programme in British Olympic history. One of their keys to success has been a programme of work, led by psychiatrist Steve Peters, to help athletes manage their emotions during competition.

Emotional self-awareness is a skill that can be learned, and involves becoming aware of the signs of emotions intruding upon consciousness through feelings and moods, anticipating their impact on thoughts, and using this conscious awareness to limit their effects upon decision and action in competition.

The potential risk here is that through engaging in constant self-reflection, the entrepreneur develops neuroses which impede their own ability to act.

In athletes, the effective self-monitoring tactics are developed and rehearsed off-line, rather than 'on the job'. Once in action, the enhanced awareness becomes more automatic and natural, allowing an action orientation which doesn't slow down real-time decision speeds.

Working to increase self-awareness is very powerful for entrepreneurs. Self-awareness can help curb the potent influences of negative emotions on goal-setting and decision-making.

2 Problem solving

"Anxiety helped in the sense that I would try and figure out every single flaw there was in my business – because all of them have flaws – so I was trying to figure out where is the hole?" one entrepreneur told us.

Actively seeking out flaws and weaknesses and doing something about them is a powerful means of reducing the fear of failure.

Intuition is a potent source of information, and research has demonstrated that among experts, tacit knowledge, and gut instinct lead to rapid and effective decision-making. Such instincts are often associated with feelings rather than specific thoughts.

Feelings of fear driven by concerns over the idea, for example, can offer important signals that work is needed. When treated as such a signal and acted upon, rather than repressed or ignored, these emotional flags can actually help entrepreneurs eliminate weaknesses and flaws in their venture idea. A proactive, problem-solving response to feelings of fear arising from the idea itself can help reduce fear. Paradoxically, our research also shows that such initiative-taking does tend to be inhibited when the idea itself is the cause of the fear of failure.

This suggests that taking a deliberately action-oriented approach, overcoming the desire to repress or ignore the problem, will be especially important. Of course, all weaknesses can never be eliminated. For any entrepreneur, perfectionism is potentially dangerous.

3 Learning

"Fear pushes me to work harder and to take more care of what I am doing, and to educate myself to be the best I can as I am developing these businesses," said one entrepreneur.

Entrepreneurs told us one of the ways in which they overcome the feelings of fear was through learning and information seeking. This might be for core knowledge, such as computer coding skills on the part of the software entrepreneur seeking finance, or for learning to cope with the high pace of activities that most entrepreneurs experience.

Entrepreneurs relied upon a wide variety of sources of knowledge and information in their search for learning. This included formal education and training, although more often involved learning focused upon extensive information seeking, reflection, and importantly, social learning through networks and mentors.

Education, training and information seeking are a powerful antidote to the fear of failure. Learning can help mitigate fears resulting from doubts over personal abilities directly by increasing key capabilities. Through enhanced capacity, learning can also indirectly assuage fears concerning the ability to obtain finance, and the venture's capacity to execute, as well as fears associated with letting others down.

But uncertainty is real and constant. Uncertainty and ambiguity are defining features of the challenge of entrepreneurship. There are always unknown unknowns out there, and so a willingness to continue to learn, gather information and insight from diverse sources can help to mitigate the fear of failure.

4 Support seeking

"A mentor is someone who allows you to see the hope inside yourself," says Oprah Winfrey. For entrepreneurs in a constant battle with fear of failure, identifying mentors and utilising networks can be a vital source of reassurance.

Mentors and social supports are beneficial because they support the three prior activities of learning, problem solving and even self-awareness. Mentors are an important source of learning.

"Reaching out to mentors that are directly related to the business you are starting is really key and really helpful," said one of our entrepreneurs.

Speaking of the impact of the fear of failure on her problem solving, one entrepreneur said: "[fear of failure] just fuelled me to learn more; talk to more people and figure out why I was wrong in the first place."

Another said: "Fear of failure forces you to come up with... better ideas and look for people that are going to give you constructive criticism along the process."

Social forms of learning, from those who have been-there-done-that seems to be a particularly powerful antidote to the experience of negative thoughts and feelings among entrepreneurs.

Early stage entrepreneurs frequently benefit from local communities and networks, providing formal or informal access to mentoring from those with more experience. Through this process they learn that feelings of uncertainty and worry are commonplace, as well as what issues are deserving of attention and which problems will fix themselves over time.

Our research suggests the fear of failure is widespread and has both negative and positive effects on motivation, decision-making and behaviour.

One important outcome that should not be overlooked: motivation from fear can bring higher levels of stress, with potentially negative health consequences as well as undermining the life satisfaction of entrepreneurs.

While all may experience it, the ability to anticipate and manage fear is likely to have positive benefits for an entrepreneur's quality of life and wellbeing.

Gabriella Cacciotti is Assistant Professor of Entrepreneurship at Warwick Business School and won the NFIB Best Dissertation Award from the Entrepreneurship Division of the Academy of Management.
E: Gabriella.Cacciotti@wbs.ac.uk

James Hayton is Professor in the Entrepreneurship & Innovation Group at Warwick Business School and is Editor-in-Chief of Human Resource Management.
E: James.Hayton@wbs.ac.uk