Dinosaurs are getting younger
Insights drawn from 40 years in business and academia

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Overview

Martin Binks has worked in academia and business since the late 1970s. During that time the nature of business school education and business itself has changed almost beyond recognition. In this collection of articles Martin draws on his experiences to provide a range of insights into a series of important and interrelated issues. It is a long list which includes leadership and management, decision-making, trust and empathy, innovation, entrepreneurship, experiential learning, curriculum design, learning velocity, creative problem solving, SMEs, business growth, business finance and the ever more relevant and pervasive notion of "creative destruction".

These articles should be of interest to academics in general; business school academics and administrators in particular; businesspeople in general; innovators, entrepreneurs and SME owners (whether existing or would-be) in particular; policymakers; providers of finance; and anyone with a genuine interest in the disruptive forces that are increasingly reshaping our world.

Introduction

I am quite old, pushing 70 years. I have been an academic of sorts all my working life. What an immense privilege; studying and researching what fascinates you and then telling others about what you have discovered or started to understand a little differently, and hopefully, better. Over time I have also accumulated quite a lot of moss; in some ways I suppose I resemble more a standing stone than one that rolls. My purpose here is to attempt to maybe intrigue, or at least spark a little curiosity by passing on some reflections from that past. These reminiscences may be of interest to some readers whilst to others they may appear mundane or even confusing, but hopefully not boring, or too predictable. They are just some of the insights which appeared on the surface of my experience, and are not meant to be carved in stone or presented as particularly confrontational position statements. I suggest that readers approach the contents more like a 'pick and mix' rather than feeling compelled to start at the beginning and read through to the end. As a friend and critic whose judgment I trust commented, this is more about a collection of observations, than a set of statements of belief or principle. At the time, the material mattered to me enough to register and literally take note, as opposed to looking, acknowledging, and then walking on past.

Compared to my much younger children, colleagues and friends, I am a relative dinosaur in my relationship with modern technology. Most would share the view that, although not yet extinct at the time of writing, my ambition to keep up with ever more rapidly changing technologies and their associated practices and terminology cooled many years ago. Maintaining technology forefront expertise requires accelerating investment and a time consuming obsession for those determined to hang on in the slipstream. Becoming more out of touch is increasingly expensive to avoid in terms of energy and time and that is why dinosaurs are getting younger. To flog the analogy one last step further, many ideas are obsolete before being fully hatched, rather like the proverbial spaceship on its way to Mars that is overtaken by a younger superior model before even reaching its destination.

This state of affairs would be deeply worrying, were it not for the fact that the same forces that advance obsolescence also fuel the potential for a revolution in new ideas generation. All is not yet doom and gloom despite those who argue that we are getting closer by the day.

I am happy to embrace dinosaur status; it is a source of relief and possibly misplaced pride, but, I confess, there is just a shadow of doubt that I might be missing out when sitting by the stream instead of swimming in the river. There is also the distinct possibility that others suffer from my growing technological laziness by having to accommodate my rapidly expanding technology deficit when I ask for help in order to ensure that my students are not disadvantaged. Fortunately I have a reasonably large well of goodwill left over from my five-year role as Dean of the Nottingham University Business School – or at least that is what I like to believe.

In order to preserve some of the insights that I gained over this privileged and wonderful span of experience, I decided to write these as individual observations, almost in passing, to remind me of the sense that I had at the time, but probably also as a modest vanity project for others to enjoy or discard. I suspect that my perambulations will ring bells of familiarity for some and prompt disagreement in others, but they are all lightly put with no serious attempt to persuade or influence; maybe just to ponder any useful insights and leave the rest behind. I have tried to order the pieces in such a way as to superimpose some structure on what is, essentially, a set of stand-alone observations or essays. Some have temporal identity as they are based upon reflections at a particular point in my experience, such as when I stepped down from being the Dean, and others because they arose as a consequence of the change in circumstances that this precipitated, as referenced in 'Stepping Down but not Away'. Others emerged, unprompted, so the final sequence of consideration may have a slightly random feel at times. Readers will also notice the repetition of some material; this arises as a consequence of the stand-alone nature of each piece and an underlying common theme around some of the implications of the current revolutions in technological change and interpersonal communications.

The first essay, entitled 'Dinosaurs are getting younger! Reflections of an ex-business school Dean', is self- explanatory. I have tried to capture some of the main lessons and insights gained from this amazing rollercoaster of immersion and experiential learning over five years as head of a large international business school. This is of course only based on my memories at the time, though I did consult with others who were active supporters and advisers, for occasional reality checks.

Decision-making is the subject of the second essay, entitled 'The wealth of difference'. Here the emphasis is upon explaining why we so often make poor decisions, and how this malaise may be

overcome or at least ameliorated by creative problem solving and radical innovation thinking. The case for a more rigorous approach is supported by an explanation of how this can be achieved in practice using our natural ingenuity more adventurously as an alternative to tentative incrementalism.

In the third piece, 'Preparing for the future by re-living the past', the focus is upon the need for a more integrated approach to the curriculum in business schools and probably more widely, with a much enhanced awareness of the history that went before. Much of our understanding of where, why and how we are, springs delightfully from knowledge of our roots; where we came from. This leads naturally on to some arguments raised when considering leadership.

The focus upon longer-term consideration is taken up in the fourth piece, entitled 'A short-term view for long-term failure'. Short-term perspectives are common to many areas of business and public sector decision-making with the attendant risks of loss of relevance and growing obsolescence. The concept of 'learning velocity' is introduced, not, I should add, as an attempt to blind with science or simply baffle with jargon, but in order to focus upon the speed at which our students learn in the direction which prepares them better for the uncertain future conditions that they may confront. Velocity is an appropriate measure, because it combines the scalar of speed with a chosen direction.

In the fifth piece, 'The requirements of successful leadership are changing faster than the leaders', the case is made for devolving more decision-making influence to those engaged in responding directly to changing conditions and uncertainty. This may be logical, but in practice it is likely to be fraught with difficulty because those closest to the action are rarely the senior staff responsible for making strategic decisions. It is also argued, that, increasingly, leaders may need to explore alternatives that sit outside their current experience and comfort. They may have to accommodate the possible necessity for radical change rather than merely incremental improvements in efficiency. They may be compelled to make profound rather than routine decisions.

In the sixth essay, 'Radical finance for radical innovation', we confront the often uncomfortable reality, that if we succeed in encouraging the generation of radically different ideas, then they will often require external finance if their potential is to be realised. There are well understood and natural reasons to expect a shortfall in the provision of external investment for, by definition, breakthrough innovations of which there is no previous experience or point of reference. Joseph Schumpeter's observation, well over one hundred years ago, that it was radical rather than incremental innovation

that underpinned economic development still applies. In order to realise the wonderful potential of our creative imaginations, there is a pressing need for an 'innovation fund' that acts as a financial provider of last resort in order to ensure that we lead developments in our economy and society rather than trail behind the exemplars of others.

In 'Stepping down, but not away', the seventh essay, the focus is upon gradual rather than sudden and complete retirement, in order to avoid squandering the tacit knowledge that has been built up over decades, by adjusting our attitudes to work/life balance. This presents problems at an individual level because we often associate lower levels of responsibility with demotion after, for many, having spent a working life seeking promotion. For the organisation, a longer-term view that attempts to capture the potential benefits of gaining a better understanding of downwards and sideways mobility as alternatives to upward travel could be significant.

In the concluding essay, entitled 'The learning game', I highlight several interrelated trends that appeared to be in play at the time of writing in 2018. My career as an academic has spanned a transformation in the provision and uptake of higher education in the UK. Over this period the proportion of school leavers entering higher education has risen from five per cent to nearly 50 per cent, alongside some widening of access and diversity in terms of gender, age and background. This has prompted much debate on the impact and desirability of expansion and further changes that are required. The main focus of this essay is on the simultaneous shift in emphasis away from information towards interpretation, analysis and judgment with the necessary accompaniment of immersion and experiential learning as opposed to didacticism. With the advent of the internet, information is almost freely accessible but understanding and tacit knowledge accumulation are more challenging. The presentation of information is no longer the jurisdiction, only of a minority with influence and often vested interests, it is a commonplace to be both celebrated and feared. Its value is subject to verification, interpretation and reliability.

The sequence of essays is as follows:

1. 'Dinosaurs are getting younger! Reflections of an ex-business school Dean'

   Keywords: leadership, management

2. 'The wealth of difference'

   Keywords: decision-making, creative problem solving, innovation

3. 'Preparing for the future by re-living the past'

   Keywords: curriculum design, creative destruction, experiential learning

4. 'A short-term view for long-term failure'

   Keywords: learning velocity, curriculum design, experiential learning

5. 'The requirements of successful leadership are changing faster than the leaders'

   Keywords: leadership, empathy, trust

6. 'Radical finance for radical innovation'

   Keywords: finance gaps, SMEs, innovation funding, growth

7. 'Stepping down, but not away'

   Keywords: trust, retirement, status, labour market

8. 'The learning game'

   Keywords: higher education, creative destruction, managing uncertainty, Schumpeter

1. Dinosaurs are getting younger!

Reflections of an ex-business school Dean

Hindsight

As the outgoing Dean of Nottingham University Business School (NUBS) I thought I should practice what I preach and indulge in a little reflective learning. I will try to capture some of the insights that my experiences have provided, some predictable and others, for me, more surprising. After five years, there is much to reflect on, much of which is generic and may be of passing interest or even helpful to those in leadership roles more widely, as well as, of course, to existing Deans of business schools. To clarify the scale of my role as Dean, it involved responsibility for around 2,000 students, 145 academics and 60 administrative staff in the UK and oversight of a further 3,200 students, 140 academics and 50 administrators based in NUBS at our campuses in China and Malaysia.

My predecessor had left at relatively short notice so I was propelled into the role with just five weeks to re-orientate my focus from running the Haydn Green Institute for Innovation and Entrepreneurship to leading the School. With some experience as Deputy Dean, I like to think that I achieved this transition with at least a veneer of calm purpose even thought I was paddling furiously below the surface for much of the time. The sudden surge in responsibilities included, of course, a freedom to make choices the like of which I had never experienced before. It was both liberating and daunting. Instead of providing sage advice and observations from the safety of the sidelines, I was suddenly both captain and referee at the same time! There was also the feeling that this opportunity was only open to a very few, that it was a great privilege bringing with it significant responsibilities with potential implications, both positive and negative, for many others. I decided it would be best to talk to the senior staff individually before making any decisions of importance.

The naivety of such a reasonable position still makes me smile; decisions on many diverse issues were required from the day I started, if not before.

Despite my close familiarity with NUBS over many years I was still unprepared for the diversity of people with whom I was immediately required, as Dean, to engage. In addition to the main priorities of

our students and our staff, there are multiple tiers of 'authority' between the Dean, Central Services like Finance, HR, Careers, etc., and the Vice-Chancellor. Then there are the wonderful opportunities provided by collaborations with other disciplines across a strong research-led university. In addition, NUBS's international presence is unique and creates the scope for many diverse initiatives. Beyond the university there are businesses (we are, after all, a business school); there are also local, regional, national and international layers of government, other business schools, our local and wider communities and many more. When people from these organisations and communities want some form of support, they will frequently start with the Dean, sometimes expecting to be directed towards a more appropriate contact but often not. Entirely understandably, people were often blissfully unaware of all the others beating a path to my door because their particular concern was naturally uppermost in their minds whereas to me they were usually one amongst many, deserving and in need of a solution but maybe not as urgent a priority as their owner felt. What they were not in a position to appreciate was the relative importance of their own concerns compared to those emanating from other competing calls on my attention, why should they? The Dean is required to balance an ever-shifting set of priorities and concerns and the potential to upset some people if they feel they have been considered a low priority, is very real. It also seemed at times as if some people spent a lot of energy finding reasons to take offence and then taking it! Others who appear to take offence unnecessarily may just be in a rather vulnerable frame of mind due to private personal circumstances of which their colleagues are unaware.

A very simple mistake for example, when combined with the immediacy of email, can escalate a relatively amusing confusion to an emotion-fuelled overreaction that is instantly transmitted before the error becomes apparent, leaving the sender feeling embarrassed and stupid. When a delightfully absent-minded professor received an email detailing his future office location, he promptly, mistakenly, and very politely, visited the wrong office as if it were soon to be his. There was the real possibility of a serious misunderstanding! When he started calculating, literally by rule of thumb, where his furniture should be placed, whilst the existing, long-term incumbent, was sitting at his desk blissfully and rightfully unaware of any planned relocation, it wasn't just maybe, there was trouble ahead with an impressive explosion of outrage and I suspect high blood pressure. Office space is a very sensitive issue for many academics; it is often felt to reflect status. The ease and immediacy of email communication can often pose a threat to reasoned consideration and discussion. The

combination of space issues and email can be toxic but sometimes, with hindsight, very funny. The email that this episode elicited from the existing occupant was incandescent; the question 'has there been some mistake?' should have been explored first, before leaping almost delightedly to judgment and anger. That's email! I tried many times as Dean to encourage everyone to 'count to 10' or, time permitting, refrain from responding for a day or so, but in the heat of the moment the advice was often set aside.

It felt personal

Criticisms levelled at a business school from students, their parents, staff and many others will often be fired at the Dean. At first, I took these far too personally but I gradually learned to address the casual tension between how one feels in practice and what reasoned consideration reveals to be a more appropriate reaction. You can never completely gainsay what you feel emotionally but the realisation that it may be misplaced is helpful.

I felt it important that leadership had authoritative confidence in order that as a School we moved in a chosen direction together. Some staff mistook this apparent clarity of purpose for their leader being virtually 'bomb proof', and indeed, this is how I felt I needed to appear at times. This, however, is incompatible with another important requirement, which is the sensitivity and empathy needed to try to understand the 'realities' of many of those I was trying my best to support. Sometimes the gulf between their perception of a situation and mine was so far apart as to beggar belief! A large part of the solution lies with your close team. I had the advantage of having spent most of my working life at the University of Nottingham. I knew well the personalities and experience of many of the academics within the Business School and also administrative staff at senior levels across the university. Like many in my position, for my close team I enlisted the support of individuals whom I respected and who were of independent mind with sufficient self-esteem and confidence to present reality checks to me and to each other. They were brilliant! I made mistakes sometimes, but like to believe that on a percentage basis I got most of it about right. Although some of my academic colleagues appeared barely to be tethered to any reality with which I was familiar or could even imagine, I got used to it and, indeed, started to feel incredibly privileged to work with them and support their curiosity driven work.

Where serious disagreements did occur, these often referred to teaching loads or the attitudes of some academics towards our administrative, professional and managerial staff (APM).

Teaching V research

For teaching responsibilities in the Business School, we use a general load model in an attempt to ensure that academics have roughly equal responsibilities in terms of teaching, research and administration. A long established guiding tradition was that all academics should be involved in teaching unless specifically appointed for a dedicated research role. Some senior staff felt that their research eminence somehow absolved them from any responsibility for teaching in general or certainly undergraduate teaching. I, and others, believed the opposite to be the case. Most staff concerned were fine after discussion but some had clearly either lost confidence in their own teaching capabilities, which can happen, or they had lost sight of the importance of this central part of our role as academics. Some academics, a small minority in my experience, treated our APM staff as if they were 'second class citizens' in terms of the value of their contribution to NUBS. My often stated observation that the APM staff were far more important to the efficient running of the School than the presence of many academics, was greeted with incredulity by a small but significant minority of staff. I always found this arrogant and patronising attitude of a few academics to our administrative staff, very difficult to accept or manage.

Having highlighted these shortcomings in a minority of staff, I should also emphasise the real and present danger of failing to recognise the excellence of the majority of those who more than fulfil their responsibilities. Most of our staff exceeded expectations routinely but were not on my radar because they got on with their jobs without complaint or fuss. Our personal development and performance review process was one of the 'meet once a year' variety at the time and I had to pursue widespread consultations to ensure that we recognised the contribution of understated excellence in performance. Dealing with problems can sometimes distract from recognising and rewarding achievements.

Reality checks

My experience really started to develop as I encountered other business school Deans from around the World. Some of the large accreditation conferences, particularly in the USA through AACSB, but

also through EFMD in Europe, provided a fascinating and very valuable insight into the reassuring commonality of our experience. This revealed the predictable similarities of managing staff, egos and personalities. It also revealed to me the interesting variety of support from other more experienced Deans which ranged from the factually helpful to the simultaneously helpful and boastful to the outright 'in your face' bore! As my experience grew and I found myself advising others, I tried to stick within the more helpful range, but may have strayed across the full array, particularly after conference dinners!

The reassurance from the common experience of other Deans was invaluable, both as a source of guidance and as a very effective way of avoiding taking matters and outcomes too personally; humility as a source of confidence and purpose, rather than as a reflection of weakness.

Unlike many business schools, NUBS evolved from a Department of Industrial Economics in the 1980s to become a large business school in its own right in the late 1990s, although it was still just one School among 28 in a large, international research-led university. It is to a large extent still subject to the same constraints and opportunities that are provided to all the other Schools. Whilst under my stewardship we had significant autonomy in deciding our strategy, aspirations and priorities but we still had to negotiate some permissions in terms of appointments and expenditure that sat outside our allocated budget. This entirely understandable management responsibility used to reside with academics, but, as Benjamin Ginsberg explains in 'The Fall of the Faculty', there is a real danger that professional administrators will encroach increasingly on the determination of strategy and financial management in universities.

In terms of my own reporting lines, I worked primarily with academics in more senior positions. Interestingly these relationships worked far better with academics from very different disciplines, such as engineering, than those with academics closer to home in the social sciences. Nevertheless, the common language of critical analysis persisted and support was usually forthcoming. This permission-seeking had the advantage of requiring my team and me to construct a strong, clear case but the cost of these negotiations was the time and distraction that arose as a consequence of the inevitable shift from trust-based relationships to the system and process requirements of justification.

The huge value of trust-based working, so often emphasised at international conferences of Deans, appeared to me to be increasingly elusive in modern organisational structures, including business

schools. I was very fortunate in working, initially, with an executive Dean who was clearly secure in his own discipline of civil engineering, whilst being strong enough to be vulnerable in mine; the world of business economics. He could share the benefits of his experience without feeling remotely intimidated or judgmental by applying these to such a different area of expertise.

I now recognise, with hindsight my good fortune as it became abundantly clear to me from my own experiences and those related to me by many others, that insecurity is naturally and rightly pervasive. We may compete in terms of accommodating insecurity, or, in extremis, pretending that it isn't there, but, depending on semantics, the madness of complete certainty on all issues is the only realistic alternative. The main challenge that we all confront, therefore, is to avoid or at least minimise the damage to the achievements of others through a strategy of control. The School and I benefited from a management relationship based on trust rather than control. Controlling behaviour is the default position for those who cannot trust or accept the judgment of others of more junior status. This can be particularly damaging when those being controlled are better informed and placed to make decisions on what is, effectively, their home ground. Complete and justified trust is a prerequisite for success at the highest level. This can be achieved by imposition, as in the case of a modern well equipped army, or through organisational culture, as is reflected in many top performing organisations, including businesses, schools, universities and many others.

I, like anyone with significant executive responsibility, have experienced this control quandary at first hand, and relied on those closest to me to provide guidance in terms of the maintenance of balance. No doubt those with whom I disagreed, would remember things differently. The negative impact of inappropriate or poorly informed controlling behaviour may be delayed for a while as the established momentum continues unsupported. One of the first signs, often registered too late, is the departure of the more able and therefore mobile staff. Realisation may dawn on those further up the hierarchy, only to find that the source of the problem has moved on; they may have become, or been made aware of the problems emerging and decided to leave, still blissfully unaware of their own role in the cycle of damage.

One aspect of my experience as Dean that I often referred to in whole School meetings referred to my recognition of the fact that I could only predict and anticipate around fifty per cent of the issues that I ended up confronting. The other fifty per cent were all a surprise, some good, some not.

The same distribution applied to the information that I received as Dean. Around half was communicated directly, usually via my close team. Direct communications require and receive direct responses but indirect information about student and staff distress, whilst it often needs to be handled with great sensitivity, may eventually also require a direct response. Advice from within my executive group and also from the HR team in the university was invaluable in my experience.

More interesting and useful sometimes, is the advice I have gained from friends and others from outside the university community. They provide a perspective that often arises from a context that is entirely unrelated to academia. Casual observation suggests that the perception of HR issues, for example, is very different in universities than in the rest of industry, maybe for good reasons!

As leader of a large, research-led business school, it was also important for me to try to retain some research profile since one of my responsibilities was to stress to colleagues the need to do the same. I felt the need to lead, to some extent by example. Luckily, my research involved working with a wonderful team of colleagues who still included me in their progress without relying on me for too much in the way of direct input whilst I was Dean. Luckier still, the focus of my research was on ingenuity and creative problem solving. I practised what I preached every day!

A Dean has a crucial responsibility to steer the curriculum in terms of content and delivery to meet the needs of students. Even where the progression to Deanship has been meteoric, unlike in my case, there will often still be a significant disconnect between the Dean's experience and the environment that the students are about to confront. Since the vast majority of my undergraduate students were under twenty years old when starting their degree, the fact that, at 60, I was in their eyes a dinosaur was painfully obvious and also true! What is less obvious is the speed at which people become 'out of date'. They continue to contribute very effectively in many ways but they are no longer at the frontier of technology and development and the latest 'tech fashion'. This acceleration in the uncertainty of our students' future requirements is a significant issue for the Deans of business schools. By their mid-20s many of our students will already be slightly disconnected themselves from the new realities confronting teenagers.

I began to realise that one of the main challenges confronting Deans of business schools was that 'dinosaurs' are getting younger much more rapidly these days.

Finally, as Dean, I found that a dash of irreverence combined with a sense of humour helped enormously in retaining perspective. We laughed a lot at situations, behaviours and at ourselves.

2. The wealth of difference

Making decisions

Hindsight is a wonderful thing, not just in the revelation of woefully bad decision-making or the understanding of amazing success but also in the provision of an infinite number of 'what ifs'. Despite being painfully aware of the futility of imagining how different things could have been, as with regret, we still cannot resist a peek, or even a full blown wallow. The world of what could have been is often a more comfortable reality than what is, and it hinges on how we make decisions. As a starting point, it is useful to assume that irrationality rather than rationality is the norm. Our decision-making processes fall within a spectrum which ranges from the trivially obvious for day to day purposes, through the lazy default to the closest plausible option or, in an attempted nod to rationality, to a carefully judged, open-minded and balanced consideration. However irrational we are by nature, clearly, for important decisions of significance, the last of these is the obvious route to pursue for ourselves and our students, so why do we often not take it? Why do we sometimes make such ill-considered and poor decisions and proceed to avoid teaching our students how to avoid doing the same? In short, why do we knowingly behave irresponsibly?

The impact of poor judgment is often then amplified given a second commonly observable malaise, a natural resistance to changing course. We often confuse commitment to a specific achievement with commitment to a particular course. The most effective combination is sometimes to be resolute in attempting to reach a particular outcome whilst being flexible in terms of the route taken. In some cases it is important just to know when to give up. Napoleon's invasion of Russia and the Charge of the Light Brigade spring to mind, for others it might be golf or learning the violin.

In many different situations we behave like lemmings when, unlike lemmings, we have the power of foresight.

This irrational but very common condition exists in part because we are not, in the main designed to consider decisions with the care and consideration that they merit. Once a decision is made then the longer that course of action is maintained, the more resistant we are to departing from it, however

gloomy the portents; commitment is not just to the plan – it is in the mind. As with the Charge of the Light Brigade, we do have an unfortunate tendency to stick to our guns rather than acknowledging the superior firepower of others!

Almost universally, the 'what ifs' are raised and considered only after decisions have been made. In many instances, particularly if there is a strong blame culture, they are raised as a means to criticise decision makers when it is clear that they may have 'called it wrong'. To prepare our students for more effective decision-making requires them to consider the 'what ifs' prior to making decisions rather than afterwards. We also need to ensure that they understand why it is so important to avoid the development of a blame culture, the climate of fear and defensiveness that it can create and the suffocation of creativity and imagination that it causes. This requires a very different view of the decision-making processes that our students and indeed all of us should be encouraged to apply in practice. The common default for applying 'what ifs' after decisions are in play needs to be reversed. If we could consider the 'what ifs' before making a decision and then determine which is likely to be the best alternative then decisions could improve. But 'what ifs' are predicated on already having a 'what is'. If we take any issue, consider briefly the available options and then jump straight to a solution, a 'what is', then we allow the justification for delaying a more careful analysis of the options until the chosen course of action has been tested through application. The failure to include all the different options available to us when confronting a decision, effectively delays the possibility of revisiting these at a later point even where there is growing evidence that our original decision was misjudged. Indeed the choice is often made quickly in order to move on rather than dwell on other options.

Making time

All of these approaches to decision-making assume that we are attempting to choose the 'best' from a set of fully formed available choices, a bit like picking a winner in a horse race. If the question were framed in terms of how to breed and train a race horse that will outperform the other horses then a very different approach to 'winners' emerges; you do not pick them – you make them. This may all seem a bit obvious given that people have been breeding and training better race horses for decades but if we drop out of our analogy and back to decision-making the implications are more profound. Instead of attempting to pick winners from a set of fully formed alternatives we need to develop a

process for building a winner from scratch. As we move away from presently perceived choices we introduce the issue of different and novel alternatives. By definition these are not immediately available for consideration because they do not yet exist in our perceived set of options. Rapid decision-making is considered a strength, even when it is unnecessary and potentially irresponsible. Neglecting to give serious consideration to alternatives may be very costly in practice; and could constitute negligence and an abrogation of responsibility. More importantly we want to include radical departures from the status quo in our set of options, not just marginally improved variants. Those tasked with breeding a better race horse are usually very knowledgeable, experienced and well connected to networks within the world of horse racing. Building a radical alternative such as a horse made from lighter materials or dramatically different dimensions is not an option but when exploring new ideas virtually anything goes. Building better ideas that are, as yet both radical rather than incremental as well as being untested, is particularly challenging because a simple reliance on track record to date is less likely to inspire radical departures from present conditions. To generate the fullest range of potentially novel but practical solutions to any issue requires a process.

The starting point for that process is the issue itself. When confronted by a problem, a natural and often instinctive response is, as referred to above, to move directly to the consideration of various solutions. In our desire and rush to 'rectify' the situation, i.e. to remove the problem, we accept the issue at face value rather than subjecting it to forensic examination to determine its root causes and component parts. This may work well some of the time but, for complex problems, a failure to give the problem proper consideration can be very costly in terms of time and effort spent pursuing ineffective or even damaging solutions such as force feeding to overcome eating disorders or overtrading to counter a liquidity shortfall. When seeking superior solutions to complex problems the full nature of the issues concerned must be explored in terms of the underlying causes; we need to know how the problem 'works' in practice.

Having identified the sources of a problem we can continue the process of creative problem solving by generating potential solutions. We cannot consider multiple root causes simultaneously, and for complex problems we may need to prioritise and then chase down a sequence one cause at a time. We are interested in considering as wide a range of solutions as is available and we seek non-obvious radical departures rather than traditional incremental modifications. This adds an interesting dimension to our challenge because it means that, when beginning our search, we cannot start from

where we are. We are seeking solutions that cannot emerge from incremental improvements to the way we do things now. As the Austrian economist Joseph Schumpeter described it over one hundred years ago:-

'What we are about to consider is that kind of change arising from within the system which so displaces its equilibrium point that the new one cannot be reached from the old one by infinitesimal steps.'

Using our ingenuity

We need to generate large numbers of solution ideas rapidly, without dwelling on or developing any individual possibility since this will simply distract us from ideas generation to idea development. We want large numbers of barely considered ideas. Having generated a large number of possibilities or 'what ifs' the process then requires a method of selection to combine and refine ideas until we reach the best.

This summary of the main three stages of systematic consideration and problem definition, solutions generation and final selection are not unduly challenging or onerous to undertake. In practice it is often mentally very stimulating, enjoyable and sometimes very funny and entertaining. We often enjoy being creative once we have overcome our underlying suspicion that we are not members of some select band of 'creatives'. Everyone is creative most of the time. There are a variety of models that have been developed and proven to support individuals or groups who are seeking novel solutions to particular problems. At the University of Nottingham, for example we have developed the 'Ingenuity' process and 'Ingenuity Online' by building on and extending previous developments in creative problem solving that have evolved over generations. From our own applications of this approach and the work of others using similar methods we can demonstrate the clear and often significant benefits of a more careful consideration of the 'what ifs' prior to committing to a particular decision. Why then do so few of those who accept and are well aware of these benefits fail to continue to apply this relatively accessible and straightforward approach to complex problems in practice, (and I include myself in this counterintuitive behaviour)?

Consider some of the main possible explanations. One could be the fact that the return on time invested in creative problem solving is unpredictable. There is clear evidence that it can be very high

but as yet no statistical analysis to indicate the probability of that being the case. It is also difficult to make valid comparisons between the outcomes of decisions based on creative problem solving and those resulting from a more pragmatic approach. This uncertainty makes it easier for the lazier of us to follow our instincts or do what we did before or simply copy the responses of others confronting the same problem.

An alternative explanation could be concern, or indeed fear, of the possible outcomes in terms of the disruption, changes and innovation that novel insights might indicate are now required. The same uncertainty that can be used in an attempt to justify lazier decision-making processes also applies to the repercussions that might arise from a radically different insight that creative problem solving might produce. There is a very natural temptation to adopt a 'head in the sand' approach due to fear of the unknown and fear of difference. Conformity and comfort zones are often preferred to unknown alternatives. The very term 'radical' sounds dangerously close to revolutionary and really can be quite unsettling. Well-designed and robust creative problem solving processes may be very effective at unleashing the insights that make for very difficult decisions when it comes to implementation. The combination of laziness and fear creates a powerful barrier to change and innovation. The resistance to change that this causes will grow as the sense of foreboding that more radical interventions may be required in the future grows. Problems arising from population growth, pollution and resource depletion, for example, are unlikely to be solved through incremental innovation. Arguments to encourage radical innovation are not restricted to the preference to avoid apocalyptic demise. As Schumpeter argued, economic development is caused by and relies on radical transformational innovation rather than incremental improvement.

This brings us back to our natural resistance to using proven, effective creative problem solving processes to enhance our decision-making as well as providing a robust rationale for the decisions made. The sheer scale of the problems that we need to confront and the urgency that prevails in many cases render risibly absurd, arguments around the return on time invested in radical innovation thinking or qualms about the kinds of solution that might emerge. This leaves the possibilities of either a lack of awareness of radical innovation thinking approaches, or a distrust of their superiority to

existing decision-making methods due to a fear of surrendering sovereignty over some of our most significant choices to what may be perceived as a formulaic process.

Applications in practice

My own experience suggests that there is a relatively sophisticated awareness of radical innovation thinking in many large private sector businesses and multinationals but that this is less the case in some public sector organisations and smaller firms. This is not an argument to support privatisation but rather a case for improving the general awareness and routine application of radical innovation thinking in these communities and, of course, first and foremost with our students.

Simply raising awareness and profile is insufficient. We may accept the probable superiority of alternative approaches but under pressure, we default to the decision-making equivalent of muscle memory just as a right hand car driver, when driving a left hand drive car for the first time will reach for the gear stick on the wrong side in an emergency. The answer to the problem of a lack of awareness lies in education in all its forms. For schools and universities responsibility sits within the curriculum; radical innovation thinking should become integral to modern curricula and their delivery.

The case of entrepreneurship education

Consider, for example the inclusion of entrepreneurship education as one route in to the curriculum that we adopted at the University of Nottingham. I first became aware of entrepreneurship as an area of academic focus in the early 1980s when I read Joseph Schumpeter's 'The Theory of Economic Development'. I found his distinction between, what we now refer to as incremental innovation, improving existing products and processes, and radical innovation, transforming these, fundamental when it comes to understanding economic development. Schumpeter explained how radical innovation inspired by the insights of entrepreneurs created new waves of innovation that, in turn, underpinned an acceleration in economic development.

I was particularly struck by the central role played by radical as opposed to incremental innovation in this process of development, and the apparent absence of any explanation as to where the novel insights that underpinned these radical innovations came from. In short, what inspired and inspires radical innovation thinking?

In the 1980s and 1990s I was advised by the 'wise' that entrepreneurship could not be taught. Having demonstrated along with many others, that this was a fallacy I then moved on to radical innovation thinking and was advised that, by definition, the ability to generate insights that cannot be traced back to present conditions through small incremental steps but requires a creative leap of the imagination, is not conducive to being learned as part of the curriculum. Fortunately our growing team became more aware of the history of creative problem solving and how, for decades, many large businesses had, in effect, been training their staff in creative problem solving and as a consequence radical innovation thinking, with frequent and often repeated references to 'lateral thinking', 'thinking outside the box', 'left field thinking', 'thinking sideways' and many more. This was common practice in large businesses and regarded as vital to retaining competitive edge through the generation and introduction of innovations in products and processes, but it didn't feature in my curricula in any way, shape or form. From our students' viewpoint and indeed in terms of our own research, it was important to close this gap. My first module, entitled 'Entrepreneurship', was introduced in the mid-1980s and focused on the history and theories of entrepreneurship with particular reference to the work of Schumpeter.

From this early, somewhat dry, and rather unimaginative beginning, came the development of effective processes for encouraging radical innovation thinking and their incorporation in the curriculum. We developed the 'Ingenuity' approach to creative problem solving based on a carefully structured set of questions or tasks set within the three phases of radical innovation thinking: problem definition, solution generation and solution choice. This approach was very well received and we decided to introduce a web based approach, 'Ingenuity Online'. In terms of the curriculum, courses to encourage radical innovation thinking are not restricted in their relevance to Business School students. This was an opportunity to enrich the curricula in many other disciplines within the university. Ingenuity and creative problem solving have generic relevance; exploring your imagination freely but systematically with an emphasis upon transformational rather than incremental improvement is as relevant in the sciences and medicine as it is in the arts and humanities. We have worked with teams within these disparate disciplines and the results are impressive.

As the modules in entrepreneurship that were introduced alongside the signature focus on radical innovation thinking evolved, they also reflected, to greater or lesser extents, the need to support our students in thinking differently, whilst retaining their disciplinary integrity, be it Marketing, Finance, Innovation, or Management for example.

The first extra dimension that entrepreneurship education provided to Nottingham University Business School was therefore the expertise and confidence to encourage radical innovation

thinking in our students, staff, large organisations like the NHS and Unilever and many cohorts of small firms.

The second additional dimension refers to our aspirations for the future. Aspirations often originate from existing goals and achievements, they are ambitious but realistic; they are the natural, but challenging next steps forward. In short, many aspirations represent an incremental improvement in our present performance. Radically different kinds of performance are often excluded from our aspirations and this behaviour is reinforced by the proliferation of target based metrics that naturally tend to refer only to current practice.

The second extra dimension therefore, that entrepreneurship education provided to the institute was this awareness of the need to apply creative problem solving and radical innovation thinking to our aspirations as well as embedding it in our existing curriculum. Whilst this may be both fascinating and fruitful, I should acknowledge, it is not easy!

Introducing rigour

In terms of the trust that we have in more rigorous and systematic approaches to decision-making we may be less trusting of 'new' approaches to anything that is presented as transformational because increasingly we are bombarded by self-help 'how to' messages and we are rightly sceptical. Overcoming this source of resistance to creative problem solving is probably best achieved by immersing people in the process whilst applying it to an issue that they care about strongly.

A compelling example of this approach emerged during the presentation of solutions from a Nottingham University Business School creative problem solving session with a major NHS trust. It came from a podiatrist. She explained how renal patients, especially those who are also diabetic, have a higher risk of amputation and the loss of toes, feet or legs. These patients might suffer from circulation difficulties or develop pressure sores from swelling. Their kidney problems mean they do not heal well, and sometimes numbness might even prevent them from realising what is happening until it is too late. There is considerable evidence of the advantages of preventive treatment, but mobility issues make it hard for patients to attend clinics. Instead they need home visits, which are themselves difficult to arrange because of the amount of time spent on dialysis – sometimes six hours a day for four or five days a week. But what if dedicated renal podiatrists were allowed to see patients

during dialysis? First and foremost, this would deliver significant benefits to the patients themselves, more of whom could receive in-clinic treatment. Moreover, as the session heard, the estimated cost of providing such treatment in the trust's three dialysis units would be less than the cost of a single amputation. The pitch was met with sustained applause. Senior management in the audience immediately confirmed that the concept was feasible and pledged to support it through commissioning routes. The service was up and running just three months later. As with so many breakthrough solutions they appear so obvious with hindsight.

From my own experience, the identification of the link between systematic and rigorous creative problem solving and superior results is most accessible through usage. Good ideas spring out of many different conditions but the ability to systematise radical innovation thinking instead of relying on chance insights, brainwaves and genius is progress as far as development is concerned, be it economic, philosophical or personal.

The problem that we confront is the pervasive inclination of many individuals and organisations to make poorly thought through decisions. Most of the time this may not be particularly costly for those affected but some of the time it can be very expensive or, indeed disastrous! Raising the minimum expected level of rigour that should be demonstrated when making significant decisions is an interesting challenge. It is akin to applying a kite mark to decision-making processes, challenging but not impossible.

With any decision there is an element of risk. At its simplest there is a risk of it being the wrong decision. Carrying that decision through will incur costs. The risk associated with decision-making can be assessed to varying extents depending on the nature of the decision but the costs may be more difficult to estimate confidently because they may arise either immediately, or in the short, medium or long term.

In order to encourage improved decision-making through creative problem solving one approach would be to ensure an element of risk sharing and make this transparent. In many situations this happens automatically. If a business makes poor decisions it may fail or lose money. Under different

operational conditions however, decision makers may, effectively, be insulated from the effects of their decisions. For example those responsible for the allocation of a budget may not be affected directly themselves if, as a consequence of their decisions, there is insufficient investment in the transport infrastructure or the health service. The impact of underinvestment is often difficult to observe or measure thus prohibiting any realistic element of risk sharing. The global figure may also conceal wide variations in efficiency.

Kite marks

If risk sharing is impractical then an alternative approach could involve the application of a systematic approach to decision-making by making the kite mark contingent on a clear demonstration of rigour via an accreditation process. There have been many attempts to develop comprehensive approaches such as ISO/IEC 20000, designed for the IT industry in 2005, or Investors in People, launched in the UK in 1991. Although these standards are widely applied and regularly reviewed it may become more challenging to ensure their efficacy as technological change continues to accelerate and working practices evolve more quickly. It will be increasingly difficult to ensure that accreditation standards do not actually constrain innovation by failing to respond quickly to new discoveries and technology.

 The tension between the imposition of specific quality assurance standards and the maintenance of a flexible competitive operating environment will continue to grow. A less bureaucratic and more pragmatic approach is required.

A third approach to the design of some form of kite mark to ensure the veracity and improvement of decision-making is to develop an aide memoire or simple checklist. This would be applied like a mirror to the creative problem solving structure with snapshots captured at critical junctures. Just as one recollection can release the whole memory of an event so the logging of one critical shift will suffice to provide access later, if needed, to the events and feelings that both preceded and followed the change.

Many computer platform based creative problem solving approaches record all the inputs made by those involved. Although this 'trace' is comprehensive, a simple memo of critical junctures may suffice to reflect the rigour of the decision-making process. These junctures could take the form of particular insights on the actual rather than apparent root causes of a problem, influential shifts in focus

prompted by the introduction of a radically different approach to a solution, or the sudden realisation of how a solution can be implemented in practice. A decision log can be assembled as decisions are made just as sailors chart a ship's course.

A final approach to encourage the take up of more rigorous approaches to decision-making could involve a physical entity which is aesthetically pleasing. It is no coincidence that many of us enrich decision-making processes by combining reflection with ingeniously and entertainingly designed software or simply the elegance of the pen with which we write. Reflection can be an indulgence as well as a requirement.

The decision log becomes the kite mark and decision makers are obliged to meet that responsibility before setting sail. In essence this is an 'ingenuity log' that captures our decision-making by distilling the process down to a set of way markers that serve as a record of our deliberations. The decision is the final entry until it is revisited due to changed conditions. The ingenuity log serves as a series of prompts to refresh the whole memory of the original decision so that we can start where we left off and apply creative problem solving techniques to explore new and radical departures when required. Understanding and marking the history behind the original decision should be portable and transferable. People can learn from the past to improve their future.

Of course, as an ex-business school Dean, I would start with our students.

3. Preparing for the future by re-living the past

The curriculum gap

As technological and social behaviours change ever more rapidly the gap between the 'typical' business school curriculum and the conditions confronting students after graduation, will continue to grow. People will lose touch with the latest developments and fashions sooner as technology drives change faster. Designing the curriculum in a business school becomes more challenging. In previous articles referencing my experience as a business school Dean, I have described this phenomenon, as 'dinosaurs are getting younger'.
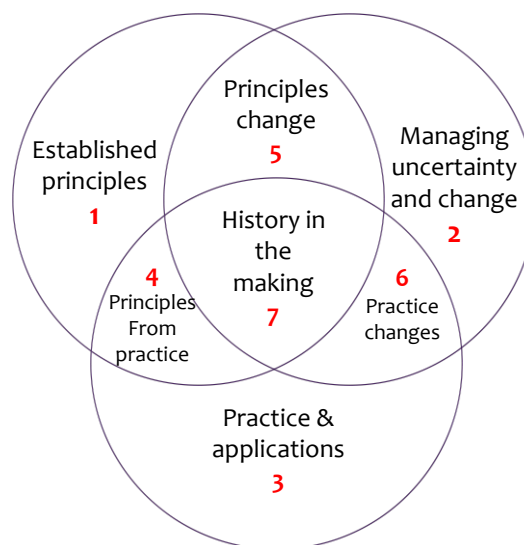
We are considering a natural process here, and one that has been ever-present throughout history. The fact that it is accelerating makes it particularly fascinating. The consequences for business schools in meeting their responsibilities to their students are profound. Business schools need to strike the appropriate balance between explaining to students how businesses behave in practice, including the conditions that they themselves as individuals may confront when they are involved in business and preparing them to manage uncertainty and change. Consider the 'limit cases'. At one extreme, we could focus purely on the underlying principles of business that we believe are applicable however the trading environment changes. At the other, we could restrict the curriculum to managing uncertainty and change because trading conditions will have evolved too rapidly by graduation for factual information content to be reliable. Although neither of these limit cases are particularly helpful on their own, they focus attention on the need to choose the most appropriate balance along the continuum between the two. This can only be resolved by deciding, however imperfectly, what a well-equipped business school graduate should know and be able to do once they graduate. If we started with a blank sheet of paper, I wonder how closely our collective conclusions would resemble the probable outcomes of present business school models and curricula! One still senses a significant gap between what we engender and what our students will need.

Although part of the explanation for this gap is provided by the observations above on the acceleration of technological change, our inability as business schools to accommodate these pressures more effectively is also caused by a lack of integration in our approach to the curriculum.

An integrated approach

The curriculum is still experienced largely through the study of separate pieces or areas such as strategy, OB, HRM, finance, accounting, marketing etc. Indeed throughout their education, and for understandable reasons, students experience learning as being segmented by discipline, and within disciplines. In their career, however, they are required to deal with a whole mixture of ingredients as just one dish and to extend my slightly tenuous analogy further, a dish where the recipe is changing more rapidly, the taste is increasingly unpredictable and some of it will be outside the previous experience of business school academics and often their students. This makes the task confronting those designing the content and delivery of the curriculum ever more difficult unless we can incorporate this constant state of disequilibrium within curriculum design. To borrow from the Austrian influenced approach to economics, we need to accept the fact that we will never achieve perfection for our students' preparation and learning, but we can aspire to a level of informed flexibility and adjustment that tracks that ever-elusive perfection like a greyhound at the races chasing the 'rabbit'.

A more integrated approach to the curriculum could be portrayed as follows:-

This simple model conceals great complexity as we consider the business school curriculum from the viewpoints of established principles and managing uncertainty and change through a focus upon

applications, past, present and future. The complexity along with some insights to a more integrated approach can be observed more clearly by considering each segment in turn.

1. Established principles

Most areas of academic study identify with sets of principles that refer to relationships within their particular domain of teaching and research. These may change through time but usually serve as an important foundation for the subject coverage and analysis. Disagreements as to the appropriateness of these sets of principles often form the subject matter of major debates within the discipline concerned and for the purposes of the curriculum and our responsibility to our students it is important to explain and contest these. This is a well-trodden avenue of opportunity to engage students with the reasoning that underpins the present state of debate and contest those where they no longer seem appropriate or where their supporters no longer seem to be completely convinced themselves!

'Those are my principles, and if you do not like them ….well, I have others'. Groucho Marx.

2. Managing uncertainty and change

Whilst many of the staff in universities and education more generally are becoming more familiar with issues around coping with uncertainty and change, the main focus here is on the need for our students to be prepared to manage their own future experience. Although less so than 10 or 20 years ago, many students experience a strong element of predictability in the sequence of their experience from school to university to a career. Their expectations and to some extent, their sense of entitlement are set accordingly. As the balance of the curriculum shifts away from an

emphasis upon information and understanding towards coping with and embracing uncertainty and change, curriculum content needs to be viewed from a different perspective that engages more effectively with experiences of change in the past.

3. Practice and applications

Engaging students with the curriculum, be it to explain principles or when considering uncertainty and change management strategies, is most effective if it is relevant to contemporary practice. Live as well as historical case studies have a role, but full immersion in actual business decisions alongside radical creative thinking where students take more control and responsibility for their learning is the key to experiencing the world of uncertainty and change for real, where benefits accrue to the students if well done and costs are incurred by them if flawed; real business is what is needed.

4. Principles from practice

Principles should underpin, however temporarily, the full array of the business school curriculum. Practice refers to the common base of activities from which all of these are derived, experienced, recognised, understood and indeed updated. It refers, as indicated above, to real business activity.

5. Principles change

However much academics in the social sciences try to emulate the natural sciences by identifying relationships that will 'hold' in perpetuity, such 'principles' and 'laws' are rare in practice. Different disciplines and sub disciplines in business schools often refer to guiding principles that are, as indicated above, useful subjects for debate but not fixed for all time.

The important point here is that the arguments presented above on accelerating technological change and its implications, would also be expected to shorten the 'half-life' of existing principles. Indeed, quite long established principles may be blown away altogether and many new, possibly transient, principles will be seen to apply for a while. Our students need to experience these changing conditions, not just know more about them. A well-known example of a transient case is Moore's Law which refers to the doubling of computer power, or more accurately, the number of transistors, every two years; an important insight but not one that will endure indefinitely.

6. Practice changes

History and prediction are the focus for understanding the implications of uncertainty and change for effective business decision-making. Taught well, history helps us to immerse our experience in past conditions. Taught perfectly and we could actually feel the elation of discovery and the passing of the familiar. The fear and the embrace of change continually rebalance as the novel moves from curio to innovation and the traditional passes into quaint nostalgia.

 This lack of permanence is captured superbly in Schumpeter's notion of 'creative destruction' where entrepreneurs cause economic development through radical as opposed to incremental innovation. 'Catastrophic' changes propel economic development forwards and destroy the established conventional wisdom.

It is the growing uncertainty caused by accelerating creative destruction that our students will confront. Those who manage this growing lack of predictability more effectively will be better placed to realise the increasing flow of opportunity that it also provides. Indeed, the experience of more rapidly shifting paradigms may generate different capabilities altogether as the immersion in our inability to attach notional probabilities to future developments prompts different responses; some will seek the reassurance of predictability through planning whilst others will simply 'go with the flow'. Another potential continuum emerges, this time stretching from the limit case of

completely planned developments to the opposite extreme of unfettered and uncontrolled outcomes, a modern echo of the planned versus pure free market debates of the past, that were particularly dominant in the 20th century and are still ever-pervasive now. In a 'perfect world' curriculum, our students would live and breathe the history of change through an immersion in past practice and experience in order to appreciate, know, understand and manage changes that they will encounter in the future along with their causes. This requires an immersion in the tacit knowledge of our economic and technological history which is of staggering effectiveness – preparing for the future by re- living the past. Although unachievable in practice, this raises the issue of how close we can get and whether new and emerging technologies can get us closer. The same technologies that accelerate radical innovation through creative destruction may enable our students to experience changes in the past so vividly that they are better equipped to manage new conditions as they emerge.

7. History in the making

Much of the learning by business school students will focus naturally on individual elements/areas but they need to be prepared to perform effectively when confronted by an ever-changing mixture of these in practice. To gain the tacit knowledge necessary to make decisions under conditions of uncertainty they need immersion in real change just as those learning to swim have to get wet. This will require an experiential learning approach to history. Futurology may be fascinating but it is speculative and it is not real for our students in the same way that the past can be recreated, though this will of course be subject to interpretation and debate. A close engagement with history, even if it is limited to the skeleton provided by the documented evidence of events, is fundamental to the understanding of changing conditions, their causes, and the opportunities that they present. As conditions change more rapidly and less predictably it is important to consider decisions more carefully if time allows in order to avoid potentially costly mistakes caused by a rush to react. Sometimes

'knee jerk' decisions are unavoidable but as uncertainty grows a reliance on instinct and 'gut reaction' based necessarily upon past experience are more likely to be misinformed and inappropriate. A more forensic consideration of the problems, the potential solutions and the best available option given present knowledge and experience, is required. We will never be able to convey a perfect knowledge of causality but we could get much closer. Casual observation reveals how often judgment precedes understanding at even a very basic level. 'Fire, steady, aim' is still the norm rather than the exception. Our students need to know and to feel this as an imperative. The past provides an almost infinite supply of experiences that can be used to enable tacit knowledge generation though immersion. The same technological progress that makes this more urgent for our students to experience also makes it more realistic as an aim. Developments in alternative and virtual realities are already taken for granted in the world of games but their role in experiential learning through immersion in the past as part of the curriculum is also a realistic prospect if we are clear about what we need to achieve for our students.

Many of the observations made above are not new and there are some stellar examples of pioneering developments in the past. Roger Martin's innovations in the design of the curriculum whilst Dean at the Rotman School of Management in Toronto is a good example but such radical initiatives are the exception rather than the rule. Despite the navel agonising over many years, little has changed, but catastrophe theory indicates, that as the gap between what our students learn and what they will need stretches ever further something may be about to snap. What might that look like?

4. A short-term view for long-term failure

Learning velocity

Business schools often display the same short-termism in their approach as the businesses they study but without the same justification, and the learning velocity of their students suffers as a result. Coupled with narrow, inadequate and inaccurate metrics this condition is exacerbated because the directions taken via the curriculum may be inconsistent with achieving the longer-term outcomes that business schools seek to engender for their students.

The term 'learning velocity' is one that might irritate or indeed, infuriate many who are attempting to introduce more transparency to discussions on teaching and learning and 'bring it down to earth' rather than proliferate jargon! Properly explained and applied, however, it is a useful concept to capture the effectiveness, impact and direction of learning and teaching in business schools and more widely. Speed is a scalar quantity and does not monitor direction. Velocity is a vector quantity inseparable from direction. Learning velocity refers to both speed and direction. It combines the learning that occurs over a particular period of time and the direction that it takes. The learning that occurs for an individual during and after an intervention or experience can take many forms; hence the long lists of expected learning outcomes that are presented in advance of particular modules, courses, experiences etc. Added to these are the many more subtle and developmental changes that the individual experiences in practice. Those responsible for facilitating the learning along with any organisation that they work with will also learn as their experience grows. Direction can also refer to different contexts, past, present, future – short-, medium- and long-term, free and constrained markets, levels of state responsibility and many more.

For the arguments presented here the term Learning Velocity has been adopted for a particular purpose and we therefore apply a very narrow definition. Its use is akin to that of a catalyst in a chemical reaction in that our understanding of it does not change during its application but our understanding of the wider implications for our students does, and often in fundamental ways.

Learning velocity is defined for our purpose as:-

'The speed at which our students' learning approaches the optimum for meeting their future needs.'

Or put another way, how rapidly are our students approaching being able to do what they will need to be able to do?

In a perfect world all student learning content and direction would prepare them ideally for what they move on to confront. Learning velocity would be one. If their learning bore no relevance to their ability to meet future challenges learning velocity would be zero. If it actively reduces students' fitness for their future, learning velocity would be negative. Interestingly, whilst the two extremes of unity and zero are difficult to imagine in reality, the possibility that the students might be damaged by their learning experiences is quite easy to envisage. Indeed it is the subject of many debates from the origins and meaning of life, through the interpretation of history to our views of scientific principles. As the accelerating changes in technology and communications enable the interactions of individuals and organisations to proliferate in increasingly diverse ways, the directional aspect of learning velocity takes centre stage because it reflects where this mass of interrelated but uncoordinated activities is taking us.

The designs of business school curricula confront an ever more challenging task in terms of preparing students' capabilities for a more unpredictable set of requirements in their future. The relevance of learning velocity is not just in terms of curriculum content but also the direction in which it takes the individual or group concerned. To return to an old analogy, whilst our students will be confronted by the dishes that result from the recipes of their day, we need to consider the direction that this implies for each ingredient, be it curriculum content such as quantitative methods, human resources management, entrepreneurship, strategy, history, or mode of delivery didactic, experiential, group based, or the chosen approach to assessment such as summative or formative.

The example of finance gaps

Consider these points in the context of a particular example; take the case of the provision of risk finance to small entrepreneurial firms. This is a crucial element of any dynamic economy because it focuses attention on that small minority of new businesses that represent one of the traditional links between radical innovation and economic development. It is also one of the areas of finance most

susceptible to gaps in provision, or market failure, because the businesses are often young and small with few assets and a new untried product or process. So how do our students start to understand, feel and experience the salient issues in this conundrum? How can immersion in the experience of financing new, previously unknown and not experienced ideas be achieved in order for students to understand the issues that arise when, by definition, there are no previous data to which potential suppliers of finance can refer? 'Gut instinct' becomes less reliable as market conditions change more rapidly in terms of demand and technology. A more grounded and systematic approach is required for financial decision-making but these are likely to rely on lender experience and the entrepreneur's track record which might be almost non existent

At the time when I taught in this area, I was also engaged in very large surveys of SMEs and their attitude to their banks, often eliciting responses from up to 10,000 firms. I could bring a freshness to the confrontation of theory with data. I think my teaching was well received but I do not believe that my students came remotely close to feeling immersed in the issues involved. They understood that the mind-sets of people in the banking sector were probably very different from those of entrepreneurs seeking loan finance and they could list the differences. I could deploy recent data, bankers themselves, entrepreneurs and their experiences but the students could not experience their actual decision-making conditions, despite using simulation games and role-play. They learned about the issues rather than experiencing them.

As my own focus moved away from finance and entrepreneurship towards invention and radical innovation thinking, I began to appreciate the limitations of any modular approach to learning where the subject sits between ex-ante and ex-post content of which they and often their teachers have no experience. In the case of financing entrepreneurs, this would refer, for example, to the creativity and invention that precede a new business start-up, ex-ante, and the implementation issues once finance has been secured and the product or process goes to market ex-post. Without these 'bookends' on each side of the financing content, their learning speed, the amount that they learned during the period of the module was lower and the direction did not relate clearly to their future requirements such as creative problem solving to generate new business ideas or the empathy skills that might have been acquired by considering how to approach the market. Learning velocity was relatively low

compared to what it could have been with a more experiential approach that covered the whole process from brain to market.

Sticking in the mind

It is a very old, but in my view, still valid gauge of learning, to remember what sticks in the mind from your own experience in the more distant past. A ripple tank in physics, measuring the speed of sound using a starting pistol and starting to think in German when staying with a family in Hamburg, would be some of mine. They stuck because I experienced them rather than learning them in abstract isolation.

Re-designing the entrepreneurship module shortly after 2000 with colleagues resulted in a very different experience for the students and the staff. In essence, the learning associated with the 'bookends' would be filled in. Students would create their brainchildren, their own new ideas, assess the opportunities, focus on the apparently most viable, attempt to raise finance to support its development and then go on to sell it into the community. Few, if any, would be successful, but as failure was recognised, those involved would be the assessors and champions for the survivors. Then they would do it all again with reflections on any wisdom gained from failure or success. I like to think that the learning velocity increased significantly, particularly for those students who were almost carried away by the experience. These kinds of learning innovation are now more common but they are often restricted to very small groups of students.

One of the issues that did arise of course, referred to assessment. We can assess student performance in terms of for example ideas generated, engagement in processes of invention and creativity etc. from both a teacher and student perspective but demonstrating equality, fairness and transparency in grading student performance can be problematic. It is easy to be distracted by assessment. Assessment should only be considered after the learning experience design is completed. It should then involve a high level of creative problem solving in determining the best design to capture the speed of the learning in the direction that it takes and how closely this refers to our notional view of a learning velocity of one.

There is a need for a more careful analysis of learning velocity and its determinants for individuals and groups. To make matters worse in terms of jargon proliferation it is helpful to consider 'learning velocity' and 'integrated learning velocity'. When we focus upon individual elements of the curriculum we are concerned with the learning velocity of each; the speed of learning and the direction it takes for strategy, finance, HR, entrepreneurship, marketing, etc. When we focus upon their combined impact in practice we are concerned with integrated learning velocity; the overall change in terms of behaviour, the net result of the particular mixture of the individual parts. In short the dish rather than the ingredients.

In previous articles I have tried to highlight some of the issues for business schools of the accelerating gap between what our students learn at university and the requirements of them that they confront after graduation. I have also put forward an approach towards a more integrated curriculum. In this essay I have introduced the concept of learning velocity to focus attention on the extent to which the speed and direction of our student learning is consistent with what will be required of them in the future, even though neither we nor they know exactly what this will be. We may not be in a position to predict, with confidence, how fit for purpose our students will find themselves but we can discuss some broad trends in learning velocity and speculate on how likely these are to be useful. Consider, for example, the present trend towards short-termism in curriculum design combined with the narrow, limited and rather superficial conceptualisations and measures of wealth that are often used in analysis and argument.

Short-term focus

A major consequence of the way in which business school curricula have evolved is that they naturally focus attention upon the short-term. We stay in the present with a nod to the uncertain future and a passing reference to lessons from the past.

We consider the prevailing financial environment, labour market conditions, legislation, policy, changing market conditions etc. Businesses operate largely in the short-term, even the largest, because they need to be aware of and responsive to ever-changing conditions. The same is true for business schools to a certain extent but they have the luxury of being able to consider and to analyse these changes within the context of a much longer period of time. Indeed it is their responsibility to

ensure that this occurs and that their findings and discoveries are disseminated to students and businesses alike. Whilst many businesses can justify operating on the basis of relatively short time horizons, business schools cannot. It could be an appropriate or defendable approach when technological and market conditions are relatively stable and predictable but not when changes are endemic and accelerating. These conditions require a broader sweep of understanding or learning velocity will be greatly reduced and subject to rapid decay.

Rather than being encouraged to consider prevailing business arrangements as the norm our students should routinely speculate on how they are likely to change. They should be aware of the significance of radical rather than incremental changes in the technological, economic and social environment. Our curricula should place much more emphasis upon long-term changes as reflected in the past, experienced in the present and expected in the future. A longer-term view often places short-term developments in a different and clearer perspective and context. Although hardly a perfect analogy, imagine attempting to analyse and explain the nature and impact of the Second World War without reference to the historical causes over decades that preceded it or the changes in social attitudes, technology and wealth distribution which followed.

Another broad trend that sits alongside short-termism in the curriculum refers to the way we adhere to incredibly narrow conceptualisations and measurements of wealth, and therefore growth, without subjecting these to intense scrutiny and criticism. Businesses focus upon the 'bottom line' and so the business school curriculum tends to do the same. There are of course many exceptions to this trend through social enterprise considerations and the growing focus on ethics but our students do not generally experience learning that is based fundamentally on the need to question all aspects of business; rather they are expected to accept most of these as given. Learning velocity is again highly restricted and constrained because the choices of direction are so limited by the measurement of wealth in terms of the market price of goods and services at a point in time.

'What the customer buys and considers value is never a product. It is always utility, that is what a product or service does for the customer.'

Peter Drucker

Measuring utility has always been and will always be fraught with difficulty but this is not a reason to justify defaulting to the tissue thin metrics that underpin our present approach. When attempting to speculate on what a learning velocity of one would look like we should be able to get closer to capturing the essence of value than metrics such as prices and incomes. More importantly, our students should discover and consider these issues for themselves through their own critical lens so that their interpretation of business and economics and policy appraisal is appropriately qualified. Working with often highly imperfect metrics may be unavoidable but efforts to improve will be discouraged if the imperfections are accepted as the best that we can achieve and the qualification of the results becomes a repetitive routine without significantly influencing the interpretation and presentation of empirical evidence.

This combination of short-termism in our approach to curriculum design and the over reliance on poorly specified concepts of wealth and output stifles innovation in business schools because the time horizon is so truncated and the subject matter is so limited.

Many of these observations have been deliberately exaggerated and are overly harsh in that they make little or no reference to the wonderful and imaginative approaches that business school academics and practitioners have introduced widely in order to bring to our students' learning a fresh, relevant and insightful experience. They are still valid, however, because they highlight one of the main consequences of our conventional wisdom and that is the way in which the scope and influence of business school education have been constricted. There is a massive variety of creative responses within the curriculum in practice but these are contained and constrained within a relatively small cul-de-sac of activities and operations. Imagine the students' experiences and learning opportunities if the prevailing levels of creativity and imagination were to be applied across a much longer time span with a far greater set of measures and concepts of wealth and growth. Imagine the irony when countries such as China start to develop more meaningful metrics for wealth and growth in recognition of the increasing irrelevance and unsustainability of current measures and the business schools are dragged along in their wake rather than leading the way!

To address these fundamental issues requires resorting to huge, largely untapped resources of creativity and imagination that are largely untainted by the conventional wisdom that underpins our present curricula. Maybe it is time to ask our students for help since they probably meet these criteria

more closely than the staff. This leads us to the central question of how this can be set in motion and practice whilst still retaining sufficient confidence in the reliability of the outcomes to justify radical change.

5. The requirements of successful leadership are changing faster than the leaders

Leading from behind

We have considered some of the implications of accelerating technological change and social media usage for curricula within business schools. It is now sensible to focus upon the implications of changing conditions for leadership and leaders. There is a natural and irresistible transfer of decision-making responsibility away from leaders towards those closest to the nature of changing conditions. It is likely that the requirements for successful effective leadership are changing much faster than the leaders themselves.

As trading and organisational conditions change more rapidly and unpredictably the qualities required of successful leaders also change.

When writing about my reflections as an ex-business school Dean I observed that the role was becoming more challenging due to the acceleration of both technological change, particularly in communication and the use of social media. The 'gap' between the conditions for which our courses and their delivery were designed to prepare our students and those that they would confront in practice is growing. Our students would be perceived as 'dinosaurs' by those at the forefront of technology and its usage, before they had even secured employment or started their own business.

The characteristics of 'traditional' leadership in terms of power, status and direction are less influential. The ability to communicate in a less status based hierarchy draw attention to the skills of empathy, the engendering of trust and the ability to apply good judgment to decision-making. Many of these issues have been discussed interminably by academics and business leaders but the missing element in most of those discussions, in my experience, is how we generate better judgment; how do we support our students to make better decisions?

The genuine combination of empathy, trust and capability is very powerful and it transfers many of the responsibilities of leadership from the individual to the team. Success, in leadership terms, refers increasingly to the effectiveness of an individual in delegation whilst still influencing or determining

direction. Old fashioned leaders who identify success with power and control may be less successful in terms of the teams that they lead. The nature of leadership is changing as the growing reliance on the capabilities of teams and their proximity to the pulse of rapidly changing conditions is recognised. Accelerating change naturally and logically places more weight and responsibility as to how to respond upon those closest to the action. Whilst the requirements of a successful leader are changing, the characteristics and motives of many who sought leadership in the past or who seek leadership now may be increasingly inappropriate. Just as a balanced and considered relinquishment of many aspects of leadership power are more appropriate many of the individuals involved have pursued leadership roles, in part, motivated by the power and status that they believe these roles will convey.

Delegated responsibilities

Consider the changing requirements of a successful leader in 2016. The usual criteria still apply in terms of providing direction and generating motivation but the recognition of an increasing reliance upon those dealing directly with evolving changes may be less comfortable. The experiential learning of aspiring future leaders is increasingly remote from the environment which they will confront. Whilst for many employees this experiential learning mismatch is reflected in a reduction in employability, for leaders it is potentially more disturbing as they attempt to deploy the approaches and indeed the aspirations from their past to a very different present. There is a risk that their motives, aspirations, ambitions and need for recognition are out of tune with the reality they confront. They are increasingly disconnected from the issues on which they are supposed to have expertise, make sound judgments and to lead. The full implications of accelerating technical and social change not only include the growing gap between our students' capabilities on graduation and the requirements and expertise that they will need to succeed effectively; they also include significant implications for the nature and practice of effective leadership. Confident assured direction may be compromised by uncertainty and insecurity. Realistic reassurance becomes less accessible unless it is couched in terms of the ability to accommodate uncertainty and insecurity. This is a difficult capability for an aspiring leader to demonstrate using examples from past practice. There are many studies and explanations of successful leadership in the past but it is interesting to consider if and why the traits of a successful leader in the future will differ from these. I like to think that accelerating uncertainty in all aspects of

life will highlight the growing importance of empathy, trust, collaboration and the delegation of power, for effective leadership. To assess how realistic this model is in practice requires us to consider what an effective leader will have to confront and overcome as change and uncertainty accelerate. We need to consider the needs of the leaders and also of those they lead.

Rapidly and unpredictably changing conditions can cause additional stress both for leaders and the teams they lead. The stereotypical buccaneers of entrepreneurship may relish the opportunities that emerge in ever-greater number and convey their enthusiasm to their own teams but they are still a small over reported minority. Most leaders and their teams are designed for responsive stability. We have relinquished the notion of jobs for life but still hanker after security. Individual medium- and longer-term planning, mortgages, families and career aspirations require the reassurance of a reliable income stream or at least a reasonably high probability of retaining one.

If, as appears to be accepted by many if not all, one of the unavoidable consequences of accelerating technological and social change is more job insecurity then we need to adapt our expectations accordingly or dispense with medium- and longer-term planning. Consider the likely impact that these conclusions are likely to have on leaders, almost from a bygone age, and their teams. Consider their likely responses. At one extreme leaders can 'bury their heads in the sand' and bury their teams with them assuming that those teams do not revolt. At the other they can embrace a growing collaboration that reveals new opportunities for mutual understanding. Most will be caught somewhere between the two and their challenge will be working out how to move more closely towards the empathy and trust based collaborative model and away from leadership models that pursue power.

From power to empathy

People do not tend to adapt rapidly as technology and social communications change, particularly as they get older. This disconnect between individuals and society presents growing opportunities for a modern business school because the issues of expectations adjustment and opportunity recognition can be addressed directly either as stand-alone topics or maybe more effectively, as integral elements of different modules. There are already significant elements within courses on innovation, change management and HR that focus upon individual and organisational expectations and how these need to be considered and managed for successful change.

To this point the focus upon leadership has been concerned with rather generic changes in the distribution of power and responsibility that are occurring as changes in technology and social interaction accelerate. In short the gap between what our students understand about leadership and what they will confront in leadership roles is growing. I have considered this phenomenon in broader contexts in previous articles. The potential implications for leadership are fascinating when viewed within that broader context that includes those who are to be led. One area of a leader's responsibility involves guiding and supporting those within their remit in adapting to the same phenomenon that they themselves confront; the growing discrepancy between what they are prepared for and what they confront in practice. Ironically, this is a timely opportunity to immerse themselves as leaders in experiential learning. They can reflect on their own contemporary experience to improve their ability to empathise more accurately with those they lead and use the learning and understanding that they themselves gain as a leader to guide them in their leadership. This may involve higher levels of shared self-awareness whilst still providing the reassurance that the leader knows roughly where they are going and even how they can get there.

Apart from changing times, the requirements of leadership obviously vary according to context and according to the nature and situations of those being led. Observing these differences helps us to identify the all-important similarities that can be involved in a leadership course with generic applicability. One of the main differences refers to the context specific expertise that the leader is often required to demonstrate in order to retain credibility with their team. Incompetence or poor track records will not impress the rest of the team, be they medics, accountants, bricklayers, teachers or indeed academics.

This does not preclude the possibility of a poor performer being promoted to a leadership role if those responsible for promotion are poorly informed as to that individual's capabilities in practice. No promotion procedure is perfect but some are more effective than others and a generic responsibility of leadership is to ensure that the processes within their influence are as fit for purpose as they need to be in times of turbulence. Aside from ever-changing contemporary conditions and content specific expertise most of the requirements for successful leadership are common, and relative variations in effectiveness are probably caused by differences between individuals. Considering these, returns us to those balances between empathy, trust, self-awareness, aspirations and judgment. Such considerations also highlight the central question of the extent to which a successful leader needs to

separate leadership decisions from their own personal instincts. This is akin to that tension that often exists between what we believe and what we feel. The role and credibility of instinctive leadership may be losing currency as the distance grows between the conditions under which those instincts were formed and those prevailing in the present. This distance refers to content and tacit knowledge rather than just time. The fundamental issue with which we are engaged renders time differences more irrelevant as the changes in content accelerate.

A choice of skills

For business schools, and universities more generally and in many respects, all areas of purposeful learning and education, there is an increasing emphasis upon the responsibility to encourage those interpersonal attributes or skills such as empathy, trust, self-awareness, aspirations and judgment. There may also be an increasing need to focus upon rational informed consideration in decision-making as opposed to relying primarily on instinct.

The extent to which this is the case depends upon how instincts are formed. If they arise from a constantly updated synthesis of changing conditions in particular contexts then instincts may be our best guide. If they are formed under very different conditions in the past then the actions they prompt may be almost entirely inappropriate and a manifestation of poor judgment. In the business school curriculum a growing priority will be to consider how we can improve our support to students in developing the traits of empathy, trust, self-awareness, aspirations to achieving these and more informed judgment.

These ambitions are not new. Many of these traits and other interpersonal skills became the focus for curriculum innovation in the early 1990s and again after 2000. They are not new but maybe more urgent.

Engendering well-judged dynamism under conditions of growing uncertainty is one of the qualities that our students need if they are to progress and feel more comfortable and less stressed as they succeed.

This is a very ambitious target for the curricula within business schools because it refers to how we influence and shape our students' instincts so that they are able to accommodate change rather than defaulting to specific decisions based upon experiences in the past that are less and less applicable.

This requires pervasive integration within our 'perfect world' integrated curriculum. In previous articles I have argued that the learning context within a conventional business school should be set within a much longer time frame.

Our students cannot be expected to understand or explore with enthusiasm the nature of business decision-making without a strong sense of history and an adventurous imagination of future potential. They need to feel the prelude and the aftermath but most importantly they need to understand how the decisions are made in practice and how the underlying processes can be improved. Most business decisions are operational but some are fundamental to the future of the business; they need to be considered in terms of all the options and not just those close to hand. This requires a more systematic approach to strategic business decision-making that, in effect, slows down the process to enable a more considered approach.

To support decision-makers in considering the widest range of options requires them to undergo what is commonly referred to as 'a paradigm shift'. They need to explore options that sit outside their current experience. This in turn reveals the need for a non-threatening way to encourage self-criticism or maybe self-critiquing. Creative problem solving approaches have been developed over several decades but the very technology that underpins leadership challenges is now evolving to support the decision-making needs of leaders and effective leadership by enabling those involved to explore all the options in terms of incremental but more importantly, radical innovation. This brings us to the knotty problem of how such innovations should be financed.

6. Radical finance for radical innovation

As suggested above, we are witnessing the early stages of a potential tidal wave of new innovative businesses. Under current conditions in the UK many of these will not have access to the finance they require to succeed. Our focus here is upon the causes of these constraints, their economic implications and a suggested solution for their removal. The consequences of 'finance gaps' in the past have been significant in terms of foregone economic growth. The arguments here indicate that, should the gaps persist, the cost to the UK economy in the future will be many times greater than in the past.

Accessing external finance

There has always been a problem for new entrepreneurs in the UK to raise the finance that they require if they do not have access to their own funds or those provided by family and friends. The finance gaps confronting smaller firms are amplified for start-ups. They were acknowledged in the findings of the MacMillan Commission in 1931, reiterated by the Bolton Committee in 1971, reconfirmed by the Wilson Committee in 1979 and repeated by the Bank of England several times, most recently at time of writing in 2015

'Now of course, SMEs have long faced a structural 'funding gap' in that a substantial number of creditworthy SMEs have not been able to obtain finance from the formal financing system, regardless of the state of the economy. As far back as 1931, the MacMillan Commission identified the difficulty for small firms to raise long-term funding – what came to be known as the 'MacMillan Gap'.

This difficulty stems from several sources: an incomplete range of financial products available in domestic financial markets; imperfect (asymmetric) information about SMEs' creditworthiness and the associated monitoring problems that might mean it makes sense for finance providers not to lend to

> SMEs especially when they lack sufficient collateral or evidence of a track
>
> record – a situation that usually describes young firms and start-ups.'

<div align="right">(Bank of England October 2015)</div>

The present revolution in social, technical, scientific and business networking creates the conditions for a rapid acceleration in the generation of new ideas and their innovation. The origins of these ideas will vary from individual insight to purposeful discovery and from lone entrepreneurs to large organisations. Within these potential innovations there will be many that require significant external start up and follow on finance. The more successful economies in this new competition for economic growth and development will be those that provide access to external finance on radically different terms to those deployed by the familiar traditional sources. For the UK and many other economies, this presents a problem for new unproven businesses attempting to realise their breakthrough innovations. There is a 'Gap' in the provision of finance for growth.

For the kinds of innovative businesses that are the focus of concern here the problems of size are compounded by their relative youth and the nature of their product or process. Many will be based on radical rather than incremental innovations. The more different and unfamiliar these are the less likely they will be to attract external finance from traditional sources because there will be few or no data on which to base a decision.

There is a 'Gap' in the provision of finance for innovation.

From a theoretical perspective, these gaps in provision arise because of the inability of the entrepreneur to capture fully the private and the social returns on their innovation. If innovators could perfectly appropriate returns then investors might be more interested. Due to the nature of social returns, this is, at present, unrealistic as a proposition. This fundamental market failure arises because the social returns from radical investment, the benefits to society more generally, are larger than the private return to the entrepreneur. In practice, of course, both are also uncertain and unpredictable.

Discrete rather than continuous change

The arguments to support the persistence of finance gaps have been well researched, rehearsed and reported over many years. In essence, the main issue can be framed as follows:-

Many smaller firms with aspirations to grow, discover that demand often rises in discrete steps that are sometimes very large as a proportion of existing turnover rather than increasing in a smooth, predictable and manageable manner. Entrepreneurs often find it difficult to turn orders down and many will attempt to increase their capital base to meet rising demand. Capital expansion may be subject to indivisibilities however, so moving from two machines to three for example, could create a 50 per cent increase in capital base or more if additional space were needed. Conditions naturally vary between businesses, industries and technologies but the underlying principle is clear; the growth rates of many smaller firms are influenced by indivisibilities when purchasing additional capital assets to enable higher levels of production.

Similar discrete rather than continuous increases can be observed in the growth trajectory of the demand for the products and services of innovative new firms. Reordering levels, once a product or process has been approved by a new and large customer may be many times greater than the original 'taster' order. This may, in turn, force smaller firms either to decline the new business or expand their capital base very quickly. The financial requirements to underpin this expansion can be very large in comparison to the asset backed security that the firm can provide unless they resort to including personal assets. From my discussions with practitioners in the area of finance for SMEs, it would appear that the inclusion of personal assets to secure finance for business expansion is much less acceptable as a practice than was the case in 1979 when I last collected evidence on this subject.

Although these and other issues have been apparent for a long time they are yet to be addressed fully through policy or by the main providers of external finance. The accelerating potential for innovation through new firm formation that is being created now through developing technologies, communications and networking capabilities lends a new urgency to its resolution.

Capital versus income gearing

One of the causes common to the explanation of each of these conditions is the innate preference, by providers of external finance, for a mainly capital gearing approach when assessing the probability of success of a new business relative to one that places more emphasis on income gearing. The former focuses primarily upon past experience, track record and asset backed security whilst the latter is more concerned with future performance. If we take the analogy of driving a car, then a capital gearing approach steers with reference to the rear view mirror whilst an income gearing approach looks forwards through the windscreen. In practice, risk and performance assessments, as a matter of course, do both, but the relative weight placed on each view varies significantly. In the past, the common experience has been too much mirror and insufficient windscreen.

Both of these conditions reflect an understandable aversion on the part of traditional external funding providers such as banks, venture capitalists and business angels to invest in opportunities characterised by high levels of uncertainty, risk and administrative cost. However, the combination of the growth finance gap and the innovation finance gap, will act as a potent drag anchor to the prospects for the financing of radical innovations unless these formidable barriers are overcome.

Origins

To understand the origins and purpose of this piece it is helpful to understand what prompted me to write it in the first place.

In 1978, as I was writing up my PhD thesis on 'The Economic Implications of Population Change' the funding for which had expired, I was offered, and took the opportunity to work for a year with the 'Wilson Committee'; the 'Committee to Review the Functioning of Financial Institutions' chaired by the then recently resigned prime minister Harold Wilson. My remit was to undertake a survey of small manufacturing firms to identify if there were any financial impediments to their progress and growth. There were, and I tried to capture the main issues in a paper published in the Lloyds Bank Review entitled 'Finance for Expansion in the Small Firm'. This was generally well received, if not, at the time, by the main clearing banks in the UK! One particular phrase caught the interest of the economist

Graham Bannock who went on to describe it in his book 'The Economics of Small Firms: Return from the Wilderness' (Basil Blackwell, Oxford 1981) as 'Binks' Law'.

> 'The smaller the firm, the larger the proportionate increase in capital base required to respond to an increase in demand, but the lower its ability to command loan and equity finance.'

Both flattered and embarrassed at the same time, I watched as Binks' Law was referred to in passing and then disappeared.

Over 35 years later, in 2015, during a chance conversation about the past, with somewhat nostalgic overtones, a good friend asked, with just a friendly hint of sarcasm, whether 'Binks' Law' still held? She had a good memory!

From my own experience and after consultations with financial and legal practitioners in the field I ascertained that the main thrust of the statement was probably still true. I also began to realise that the potential implications for the UK economy were far more serious in our newly networked world than was the case in 1979 despite other recent development such as crowd sourcing/funding.

The advent of the internet and social networking combined with rapid technological progress across many, and diverse, areas is transforming the conditions for ideas generation and potential new business formation at a much faster rate than the providers of external finance are equipped to accommodate. As the frontiers of technological and communication opportunities accelerate away from those responsible, in part, for their support, there is the potential for a vacuum in financial provision just when external funding is most needed. Dramatic changes in conditions require the design and rapid introduction of very different approaches to the financing of innovation.

The opportunity

The stage is set for one of the most significant junctures in UK economic policy decision-making. The components that can lead either to a new scale of radical innovation-led economic development or one of the greatest missed opportunities for decades, are coinciding.
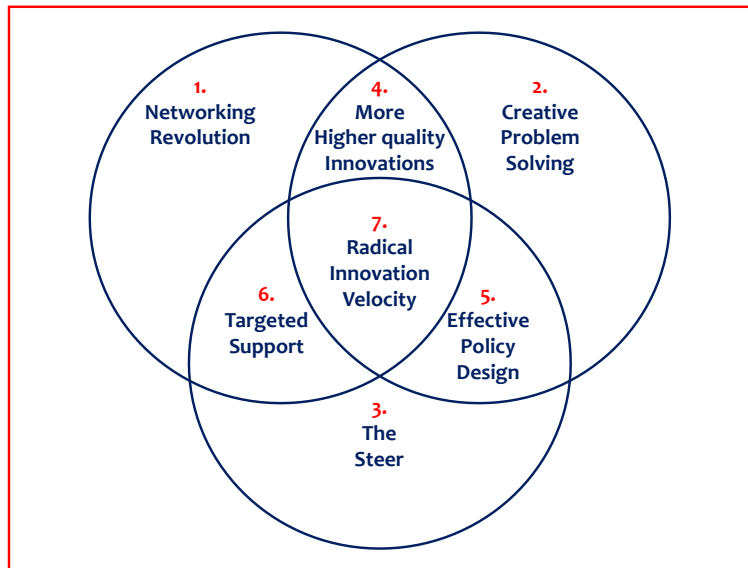
The component parts of this opportunity include the following:-

- A networking revolution.

- Creative problem solving processes.

- The direction of economic development – the 'Steer'.

When it comes to realising the potential of radical innovation, the history of UK economic policy is often construed as the failure to capitalise on the natural inventiveness and creativity of its people. This is an oversimplification of what is actually a highly complex network of issues. These are often considered individually within the framework of market failure and refer in turn to finance and capital more generally, labour alongside product and process markets. Policy interventions are then designed to address each of these failures, but in isolation rather than as a set of interrelated issues and responses. The absence of an integrated approach to what is essentially a set of interconnected market failures means that many individual policies focusing on, for example, finance or skills or prices or science or education may be sub-optimal at best and some may have negative implications for other markets. When the failures persist, the shortcomings of policymakers are held responsible and the tired debate between free market forces and intervention is rehearsed yet again.

The coincidence of the components identified above presents the potential for a perfect storm of opportunity recognition, radical innovation and economic development. At the same time, of course, it creates the possibility for a very expensive failure of imagination and policy if the opportunities are not grasped and realised.

Dimensions of the Opportunity

1. A networking revolution

The set of prerequisites for any particular successful innovation rarely sits fully within the control or boundaries of one individual or organisation. The growing practice and popularity of open innovation is one rational response to this reality. Partnerships and collaborations are others. The successful completion of the whole set relies upon the mutual awareness of developments and constraints at any point in time, by the individuals and businesses involved in generating the solution. This requirement relies upon and is facilitated by networking.

2. Creative problem solving

There are now several robust and proven structured ways to generate, test, improve and implement new incremental, and more importantly, radical ideas.

3. The steer

As explained so clearly by the author Mariana Mazzucato, the main burden of risk in the pursuit of radical innovation rests with the state and its support for fundamental research. This in turn implies a need to decide on the preferred directions that economic development should be encouraged to take in different spheres of activity.

4. Ideas generation

Combining the networking revolution with creative problem solving will generate more, higher quality ideas.

5. Policy

Combining creative problem solving with the state's declared preferences in terms of the direction of innovation produces more effective policy design for their achievement.

6. Support focus

Combining the state's preferences with the networking revolution indicates where support should be focused.

7. Innovation velocity

The overall combination of these elements will determine 'Innovation Velocity'; the speed and direction of development.

As Schumpeter argued over one hundred years ago, economic development occurs as a consequence of what we now refer to as radical rather than incremental innovation. Schumpeter envisaged significant resistance to attempts at radical innovation in practice, arising from the institutional and individual commitment to the status quo. Eventually this dam of resistance would begin to give way as pioneer entrepreneurs managed to realise their innovations despite rejection by the likes of financial and legal institutions alongside prevailing fashions and traditions. As it collapses the dam releases a wave of radical innovations, the progress of each being eased by the resistance overcome by their predecessors. The directions that are now emerging in terms of networking, knowledge exchange, creativity and creative problem solving offer the prospect of a more rapid and efficient acceptance of radically different ways of designing and delivering products, processes and technological change. Increasingly, in both products and processes, newness, originality and difference are regarded as attractive characteristics in themselves. The main section of Schumpeter's dam that still needs to be breached concerns the provision of finance for innovation and growth. When the constraints from these persistent lines of resistance are removed then entrepreneurial activity and the next wave of innovation led economic development can flourish. Countries and economies that achieve this more effectively, will be more successful in terms of performance, be it in

conventional economic and commercial competition or more importantly in terms of the confrontation and successful accommodation of environmental resource depletion.

Potential impediments

This brings us to the possible constraints or pinch points that may impede or prevent our progress.

The flow of new ideas

In many senses the networking revolution is the quintessential example of freedom of thought and development as well as providing scope for levels of manipulation, marketing and individual targeting on a scale that is unprecedented. Since the barriers to entry to this networking revolution are relatively low, it is unlikely that constraints on our ability to join the paradigm shift will arise from this source. If we accept that the networking revolution has the potential to accelerate significantly the flow of new ideas and concepts without serious constraints then the next point of focus refers to their selection and enhancement through the application of creative problem solving or radical innovation thinking.

Radical innovation thinking to ensure quality

Although the application of this simple three stage process appears to be growing in popularity, there is a danger, in our 'perfect storm' that, as the saying goes, we place the cart before the horse. As the networking revolution accelerates the generation of radical insights with respect to particular issues is likely to rise faster. The challenge is to incorporate this radical innovation thinking approach to solution generation and enhancement before fully formed concepts have emerged. Individuals and businesses tend to be quite resistant to 'going back to square one' once a new solution has been discovered and agreed. There will need to be a culture that accepts radical innovation thinking either as a norm, or,

alternatively, as a requirement; the provision of finance could, for example be contingent upon the demonstration of its application to the project under consideration. Acceptance as a response to informed arguments is more likely to succeed than attempting to compel or enforce the application of creative problem solving techniques. These tend to work more effectively in an environment of enthusiastic open-minded trust and collaboration rather than one of imposition and compulsion, where its proven deployment is simply regarded as a means to an end.

Overcoming this pinch point cannot, realistically, be postponed until a pervasive culture of radical innovation thinking has become established. Such a task relies upon medium and long-term change throughout schools, universities and businesses both in the UK and with our changing trading partners in the world. This leaves the alternative of linking it to external support on advantageous terms. Instead of regarding a needs analysis as purely demand driven, however, it should also be considered as a supply-side issue. Some form of high visibility 'Innovation Network' or 'iNetwork' with comprehensive and generous resources is required in order to attract the attention and interest of potential innovators. The main point is to establish a focal point that invites and encourages innovators rather than waiting to see if the new idea under consideration can survive the filters of traditional financial provision. Potential entrepreneurs attempting to launch radical innovations will be aware that there is a provider of last resort that operates according to very different principles, prior to commencing attempts to secure finance from more traditional providers. They will not give up if support from these sources fails to materialise.

Barriers to implementation

Barriers to implementation need to be removed if the accelerating progress of both new technology and radical innovation thinking are to be sustained. This sits neatly with the supply-side approach and design of the iNetwork that is needed in order to ensure robust radical innovation thinking during the genesis of new ideas and concepts. It is also

consistent with the potential to synchronise more accurately, economic developments with technological advances implemented to create radical innovations. The filters used to control access to the iNetwork provide those responsible for its dissemination and deployment, with the ability to steer the economic development created in their preferred direction.

The role of the state

The general assumption, almost a given in the UK, in the 1970s and ever since, is that state intervention to support the efficient operation of markets was the most appropriate approach to encourage innovation. Responsibility was limited to ensuring that markets were 'innovation ready' rather than intervening directly in the direction that innovation should take. More to the point, the USA and particularly developments in areas like Silicon Valley were held up as classic examples of free enterprise, encouraging innovation and economic development. This view would have changed dramatically if the messages presented in Mariana Mazzucato's excellent paper, 'The Entrepreneurial State', had been available for compulsory reading. Her study reveals how the major risk taker in early stage new concept funding was often the state. The depiction of the pioneers as heroic swashbuckling risk taking entrepreneurs is misplaced in many cases. More importantly as Mazzucato explains, this is an entirely appropriate role for the state to adopt. Much of the content and the arguments and views presented here have benefited from Mazzucato's paper and the clarity and persuasiveness of the analysis presented. It will be the responsibility of the state to design and provide the very different financial support that is and will be needed; the overriding constraint in the UK has, for several decades, been a shortfall in access to finance to meet the particular situations and requirements of smaller firms seeking to grow rapidly, particularly new businesses and those based on the innovation of radically new concepts.

There is no reason to assume that people who have new and viable business proposals should happen also to have access to the funds that would be required to realise the proposition as new

businesses. Some will, but some, and probably most, will not. As the speed of technological and creative advance accelerates there is a growing need for a dedicated source of finance for start-ups that is free from the traditional requirement of capital geared reassurance through asset backed security, track record and many aspects of due diligence. In short, we need a much more loosely framed income geared and responsive source of finance that uses the windscreen rather than the rear view mirror to determine the sources and direction of future progress. Radical innovation in a world of accelerating change requires radically different financial instruments and products. The iNetwork needs to be supported by an 'Innovation Fund'.

The Innovation Fund

In order to protect the origins of entrepreneurial creativity from the more traditional capital gearing assessment approaches deployed by existing external financial providers, we need a clear departure from the present rules. The main focus of assessment will be on the idea itself and its potential. Traditional assessment criteria are appropriate for 'business as usual', but 'business as difference' requires an alternative set of filters. Estimates of return on investment and profitability will carry far less weight in the decision-making process because, by definition, there are no previous data, we are into very carefully considered speculation!

The precise design of these filters is difficult to predict but one approach to their identification is to consider what a 'perfect world' model would look like.

It probably depends on who you ask, but bearing in mind that a useful perfect world model sits within realistic achievable contours rather than being a wish list in a game, then it might be expected that the following elements would be present:-

- Complete transparency in terms of the frontiers of knowledge and discoveries in development. As indicated earlier, radical innovations usually combine insights and discoveries from multiple sources.

- Pervasive networking not only allows fuller transparency on the changing and developing reservoir of new ideas and concepts – it also ascribes temporal transparency to their origins, ownership and intellectual property rights.

  With a clear view of the genesis, ownership, quality and understanding of new concepts, it is then appropriate to assess their viability by examining their potential contribution alongside the associated costs and benefits.

- In a perfect world, given the decision to proceed, the originators, or owners if the concept has been sold on, will then provide an estimate of what is needed in the way of finance and other forms of support to ensure successful launch and innovation. The estimate would be produced using robust diagnostic software. The system developed for our new world model would be continually updated as it learned from its own operations and the outcomes developed as a consequence. If external funding is required it would be assessed using traditional criteria and due diligence. Where this fails to attract sufficient funds, the concepts would automatically be referred to the 'Innovation Fund' for support.

- The Innovation Fund would be very much a 'provider of last resort' rather than being made available alongside and competing with the range of traditional and alternative possibilities. Following an exhaustive analysis of the radical innovation thinking and diagnostic software results, then, given a positive assessment, finance would be made available to support the new venture to its break-even point. In the event of failure, the funds allocated would be fully written off. If successful the advance could be repaid using an affordability algorithm to determine the capital repayments plus a charge on the outstanding capital. This charge could relate to the notion of the 'natural' rate of interest. In this perfect world model this would be equivalent, for

example, to the Financial Times Lexicon definition of the neutral (natural) rate of interest, i.e., the rate at which real GDP grows at trend rates with stable inflation. Although estimates vary, and the rate itself would be expected to fluctuate over time, this would probably refer to a value between 2.5 per cent and 5 per cent. The returns to the fund for further investment opportunities are uncertain because they will depend on the performance of the businesses supported. Since the whole purpose of the fund is to support new businesses based on radical innovations it should also benefit, to some extent, from their success. Some form of external equity participation by the state would need to be applied, possibly again based on the notion of a natural rate of interest rather than profit maximisation.

Some new businesses supported by the fund would turn out to be very 'high fliers' like Google for example. Having funded much of the underlying science and radical innovation underpinning their flight, it is important in recognition of this investment that the fund receive a return on the original investment. Given its in built facility to learn and improve in performance this would make the Innovation Fund an increasingly attractive target for investors of many kinds. The finance gaps that confront smaller, newer and more innovative businesses occur because they refer to each business individually. Each individual business fails to attract external financial support based on its particular risk profile and characteristics. The Innovation Fund would provide access to a diverse portfolio of these 'risky' businesses with unknown potential. Many investors choose to hold a diverse portfolio in terms of risk and uncertainty. There is often a desire to hold a small proportion of their investment in high risk, potentially high reward ventures. The Innovation Fund would provide that opportunity because the combined risk profile of the businesses involved whilst still uncertain, is far lower than that of any of the individual businesses receiving funding, taken on its own.

The Innovation Fund may also provide a more attractive vehicle for individual investors who are at present drawn towards the potential of 'crowd funding'. Crowd funding is a relatively new phenomenon; it is still growing and evolving rapidly both in terms of the amounts raised and the diversity of investors involved. I have argued that the Innovation Fund would apply very different criteria to those applied by conventional providers of external finance with much more emphasis upon future prospects (an income gearing approach) and less on past experience and performance (a capital gearing approach). In many ways this approach has much in common with crowd funding in that many of these same aspects of traditional and robust evidence based due diligence are absent. More weight is placed upon the emotional or 'gut instinct' appeal of ideas put forward for crowd funding consideration. For the recipients of crowd funding there is the potential upside of rapid access to funds but this is accompanied by high levels of uncertainty and the disclosure of significant intellectual property. Many new businesses require successive rounds of external investment but crowd funders may be less attracted to this prospect than they were to the original concept. For new business propositions that have exhausted approaches to traditional sources crowd funding may be appropriate if there is no need for successive rounds of funding on the basis of a long-term relationship.

Although difficult to predict, where there is the prospect of successive rounds of funding them crowd sourcing is probably inappropriate.

The Innovation Fund would be designed to avoid these untimely distractions for the particular subset and focus of new businesses that they are designed to support. Crowd funding cannot be relied upon to provide the external financial support that many new businesses in this latest Schumpeterian wave of innovation will require.

To summarise, one version of a 'perfect world' model to guarantee the financing of viable new businesses based upon radical innovations would have the following broad characteristics:

1. Pervasive and unfettered networking capability for individuals and businesses.

2. Transparency in the awareness of the flow of new concept ideas.

3. A pervasive culture of radical innovation thinking.

4. Transparency from the outset in the ownership and control of the intellectual property rights underpinning new concepts.

5. Free access to robust concept assessment diagnostics that are web based, network based and face-to-face with experts.

6. Free access to robust financial needs analyses through proven diagnostics.

7. Free access to personal mentoring and face-to-face advice and guidance.

8. A very high profile innovation fund as provider of last resort to businesses based upon radical innovations.

The role of the state (revisited)

The prospect of designing a policy driven adjustment path that leads the UK from where we are now, at 'A' to an innovation environment at 'B' with these characteristics, is at best, staggeringly ambitious, and given the prevailing political climate more likely to be judged both naive and unrealistic. The policies would appear to run contrary to many market based philosophies but their main purpose would be to ensure that radical innovation ideas survive to be able to enter those markets. In reality the state would be entrepreneurial in ways that entrepreneurs are not. The state would provide the platform which the new generation of entrepreneurs might need. In many respects the foundations for many of these provisions are already present through existing policies, both central and regional, designed to provide support to SMEs in a wide variety of areas including finance and skills but

coverage and quality vary in terms of depth of impact and accessibility. They were designed with present rather than future conditions in mind.

It is also important to acknowledge that, whilst the potential scale of missed opportunities in the future that these suggested interventions are designed to avoid will never be known, the root causes are not new. There is a long history of policy initiatives that were introduced in an attempt to avoid similar losses of radical and incremental innovations in the past. A good example of these is the history of the National Research Development Council (NRDC) established in the UK by the Attlee Labour Government in 1948 with the specific purpose of exploiting some of the many innovations that had emerged during the Second World War. Later, in 1975, the Wilson Labour Government created the National Enterprise Board (NEB) which acted as an external finance provider of last resort by adopting a longer-term view of future potential than was practised in the private sector. The NRDC and NEB were amalgamated in 1981 to form the British Technology Group. Despite the original much broader remits of its component parts, BTG plc gradually evolved into one of the leading international providers of specialist healthcare. It is beyond the focus of this article to explore in more depth the fortunes of these and other similar policies but this particular example does reinforce the need for the state to retain responsibility for the provision of external finance to support selected radical innovations where these fail to attract funding from the private sector.

The most radical policy proposal here concerns the Innovation Fund because, as with many radical innovations, we do not know what the net costs to the Exchequer will be or how these may change as technology evolves and the diversity, ease and speed of communications accelerate. Whilst responsibility for the underpinning of the fund should reside with the state, it is unclear where responsibility for its efficient operation in practice should lie. It would seem logical that it should utilise existing networks rather than attempting to create a new set of outlets throughout the UK. Although earlier steps in the application and assessment process could be based within a virtual environment, later stages such as concept development and discussion could be much richer and more effective on a face-to-face basis. This would also enhance security by helping to verify that applicants are genuine and are the originators of the radical innovation under consideration. In some respects, the banking network is the most and also the least obvious choice of delivery vehicle. The most, because their

networks are well established and pervasive. The least, because they are indelibly linked, through training, credit scoring models and experience, to traditional loan assessment approaches from which the Innovation Fund is designed to be such a radical departure. Serendipity may still intervene however; many of the banks recognise their need to change when dealing with smaller businesses. Previous attempts to close the finance gaps confronting smaller businesses, such as the Small Firms Loan Guarantee Scheme failed, largely because the banks were not sufficiently involved in or engaged with the problem solving and solution design process. Designing a mechanism whereby their networks and staff could be used to deploy the Innovation Fund without gradually distorting its operation towards their preferred assessment processes could be a significant opportunity. With mixed teams of bankers, innovators and others a radical step change in the role of the banks could be reached through creative problem solving. 'Radical Innovation Services' could be a lucrative extension to the role and responsibilities of the banks given the potential for follow on business of a more traditional nature from recipients of innovation funding who succeed. This enhancement in role could also do much to improve the image of banking at a time when it is both needed and desired.

The importance of the Innovation Fund to ensure that we catch the wave is clear. Only then can we dispense fully with Binks' Law because the conditions underpinning it will no longer apply.

7. Stepping down but not away

The retirement default

Individuals, communities, society and economies are often in thrall to an unwritten but almost universally accepted rule that individual human capital grows, develops and ascends before being almost summarily, completely retired. Achievement and often increasing responsibility culminate in departure.

Given the value of experience and tacit knowledge it might be expected that the contribution of many individuals follow a normal distribution. This would reach a peak in terms of achievement and responsibility before gently starting to decline as work/life balance considerations change and differently informed expertise comes to bear through younger people. Instead, for many, they reach the 'peak of their powers' and then just stop. This deeply ingrained and accepted lack of symmetry in the development of human capital is changing. The revolution in communication and accelerating technological advances mean that behaviours previously taken for granted are more vulnerable to question and to change. The implications are profound because traditionally accepted ingrained behavioural traits are unlikely to be eroded and replaced at the same speed that economic conditions are evolving.

As the nature of economic and social competition changes, there is a growing risk of underperformance if we continue to squander the contribution of those moving into the second half of the distribution by their stopping at the apex rather than naturally slowing down. There is, however, a natural explanation to stopping rather that stepping down and staying. It is the line of least resistance for many who fear that stepping down is the equivalent to demotion and loss of influence hence the strategy to 'quit while you're ahead'.

The prospect of moving on from a position of seniority tends to focus the mind, sometimes in a very positive way, on the tasks and responsibilities that can now be passed on. It is similar to that feeling of glee when we discard our revision notes and preparation after exams; in my case by burning them all!

There were no resits. Less apparent are the issues that arise after moving on, referring to our future purpose and meaning, raising the question: 'What am I for?'

After I completed my five-year term as Dean of Nottingham University Business School, I reflected on what I had learned and tried to capture some of these observations in articles based on 'Reflections of an ex-business school Dean'. Many of these were well received and I was encouraged to contribute further reflections on more diverse issues.

Poor preparation

My tenure as Dean was followed by a generous year of study leave. Several rather predictable realisations caught me unawares when I returned to the School as a professor rather than as its Dean. Like many experiences, even those that have been identified beforehand and in some senses are prepared for, the likely impacts of change may have been explored and considered to a greater or lesser extent, but they are only felt and understood fully when they occur. Just as tacit knowledge can only be gained through immersion and experience, the impacts of a sudden change in role and status can only be appreciated through the experiences and feelings they cause. Whilst it is natural to appreciate and attempt to harvest the 'wisdom and insights' gained prior to the change, we are often less inclined to consider the potential value of the experiences that emerge afterwards. For example, so unprepared are many for the experience of retirement that, when asked about the reality, they revert to a default response along the lines of 'best decision I ever made, I only wish I had done it sooner'. Sometimes such responses give the impression more of an attempt at self-reassurance than considered reflection. For many, it may seem uncomfortable or inappropriate to explain that the experience of retirement can be very disorientating and confusing for quite a long time. Casual observation suggests that this is often the case in practice.

Retirement is obviously more fundamental than stepping down in that it often refers to a complete absence of work engagement; in effect it is the potential squandering of tacit knowledge accumulated over decades of experiential learning. Although more preparation would often be made available to

support those retiring from senior positions there may be none for those stepping down to a different position.

This is all fairly understandable, easy to explain and quite predictable so why should it be a source of concern? To answer this we need to consider the impacts at both a personal level for the individual concerned and at an organisational level in terms of wasted resource and reduced productivity.

At a personal level, it should be noted that these reflections are based upon my own experience as an academic. Conditions vary significantly between individuals and between different sectors, but I believe that some of the underlying principles have generic commonality and interest to ensure that the discussion is not restricted, in terms of relevance, just to academia.

The reasons why some may find themselves returning to a different, and in some senses lower status, vary. For me it simply reflected the fact that my five-year term as Dean had come to an end. Others may have been asked to 'act up' for a period of time while the position they took up on a temporary basis was advertised and filled. Whatever the reason, it may be the case that, on their return, people discover that things have moved on and some of the responsibilities which were part of their role previously had necessarily now been taken up by others. This could be as simple as the transfer of teaching responsibilities or more subtle shifts such as the determination of strategic direction. In principle, you would fervently hope and expect those teams that you may have helped create, have moved on without you. Indeed, were that not the case, their lack of initiative would indicate major weaknesses in the way in which they were established in the first place. There may be the merest hint of feeling excluded, but objectively you understand that this is simply fallacious paranoia, although as the saying goes: 'Just because you aren't paranoid, it doesn't mean they're not out to get you.'

Some unhappy returns

Although to be expected, these differences between the original role and the return can be confusing in terms of self-esteem and purpose. In my case I was already approaching my mid-sixties, so these

feelings, whilst still present, were relatively less threatening than might have been the case 20 years earlier. However, the personal characteristics that had originally propelled me towards leadership, such as competitiveness, ambition, organisational success, empathy and decisiveness had not simply gone away. Channelling these without clear objectives was a new experience. I was a relatively well equipped and qualified potential leader with no aspirations to apply these skills further by, for example, joining the ranks of senior academic administrators in the university even if they had wished me to do so.

My reappearance in a role that I had occupied previously could also be problematic for others, particularly for those delivering on activities for which I used to be responsible. I realised that much can depend on the confidence and self-esteem of others and the sensitivity which you demonstrate yourself. You can still bring significant additional value if your return is well considered, trust is sustained and others do not feel your greater or different experience as a threat. This is easily written and appears relatively straightforward. In practice it may be very challenging because successful re-entry relies upon high levels of self-confidence, trust and empathy for many of those closely involved, but we are dealing with people here with all the different balances between insecurity and self-awareness that this entails.

Irrespective of how vulnerable or robust you feel you are, stepping down necessarily changes your self-perception, and more significantly , the way you are perceived and viewed by others. Rising through various levels of responsibility may reflect different mixtures of competence, ambition, ruthlessness and empathy but it does usually attract attention and it does mean that your own attention is in demand. How people adjust to 'falling off the radar of others' raises the familiar and age old tension between how they believe they should react and how they actually feel in practice. This disparity can easily be dismissed or underestimated in terms of the inner confusion and insecurity that it can cause. Reconciling the outward image and the internal doubt can raise issues and reflections never previously experienced.

For the organisation attempting to navigate their way through these ever-changing rules of engagement, the benefits to be gained through a better understanding of downwards and sideways

mobility rather than simply focusing on the upward, could be significant. The wastage of tacit and experiential knowledge would be reduced and overall productivity and competitiveness could be increased. That just leaves the 'how?'.

The missing labour market

For individuals there are many different influences. The expectations for retirement and complete departure are still, to a large extent, ingrained from tradition. Many will look forward to the full relinquishment of responsibilities and anticipate the forthcoming freedom to immerse themselves in other aspects of their lives with delight. Others may welcome the extra space and time whilst hoping to manage the impact of the change in role and income by being paid to return on a temporary part-time basis. Some will find themselves caught unawares by the sudden change in role and status and bereft in terms of purpose or meaning. These differences in experience arise due to the disparity between the levels of development and sophistication in the labour markets for those of 'working age' and those that apply to people of 'post working age'. As this distinction becomes less relevant, the development of a more inclusive labour market could emerge. At present the choices made by 'post working age' people are constrained by the lack of clear options that are simultaneously available, realistic in terms of feasibility and reward, and transparency. There is no clear 'post working experience' labour market. Those who return on a part-time basis often do so subject to a negotiation with their previous employer. The notion of a market for the experience, skills and competences learned from a career in one industry, such as a private sector multinational business to be deployed in the NHS for example, is largely absent, but the rewards from such mobility could be significant. My own observations suggest that the experience, tacit knowledge and skills such as radical innovation thinking, decision-making, logistics and human resource management can be learned in the private sector and deployed very effectively in the public sector despite contrasts in cultures. Interestingly, it is less clear to me that the same can be said of transfers in the opposite direction except maybe on a short-term role exchange exercise for experiential learning purposes, but I could be wrong.

The labour market, for those who choose to step down or sideways in terms of hours or levels of responsibility, is poorly developed and lacks any semblance of transparency. Ingrained traditions and cultures within the workplace mean these conditions are likely to persist, acting as drag anchors to

changes in supply. This inertia may be short lived however, given the rapidly evolving potential offered by social networking and the low barriers to entry of establishing dedicated platforms on which new markets can emerge; with radical innovation thinking, behaviours and conditions could be transformed rapidly. New kinds of markets could emerge with very different characteristics to those with which we are so familiar and accepting and expecting. To remain competitive in this fluid and uncertain environment requires high and sustained levels of labour market flexibility. Responses to the opportunities generated by a rapid growth in the market for those stepping down but not out could fall into two broad categories. Some might view this increase in the supply of labour as offering the potential for exploitation, whether of the incoming part time supply or those with whom they could be competing. Given the need for sustained flexibility and the greater experience of incoming skilled individuals, this might be self-defeating in the medium and longer term if the markets concerned develop a reputation for poor working practices. The alternative and ethically preferable response would be to take a longer-term view and ground these new working relationships in trust and loyalty. In practice the offerings may be a mixture of the two with the more 'short-termist' approach yielding over time to a longer-term view; again, this may of course just reflect my own rather 'rose tinted' perspective!

Much of the previous discussion has referred to a small relatively senior and maybe more sophisticated subset of the labour market in general but the notion of 'retirement age' is pervasive. Market transparency in terms of opportunities may be revolutionised through social networking platforms but the same may not apply to working conditions and levels of reward more generally. A completely different set of radical innovations may be required to reduce the market failures that underpin exploitation and abuse. The sources of the insights that underpin these innovations will differ according to variations in context.

Where the aim of teaching is to encourage radical innovation thinking, individuals and groups often require a challenge on which to focus. This acts as a vehicle for their learning. Where a focal challenge is absent, it would be fascinating to discover the nature of new ideas that emerged were the case of removing the market failures that underpin exploitation and abuse in the workplace to be introduced as the vehicle for learning creative problem solving. It would be particularly enlightening to

compare solutions from difference sources such as students, businesses, small, medium and large, academics across disciplines, from all tiers of status and activity, those who are unemployed, others from different countries, and many more. If these could be harvested and then presented in a single collection, imagine the insights that this could provide in terms of the ways that the 'labour market' operates according to different perceptions and perspectives and how these change through time. As a natural extension of this theme, consider the potential for ideas generation that would be created if a large and growing international panel of enthusiastic participants with access to proven creative problem solving processes could be harnessed to apply radical innovation thinking to issues of contemporary focus. Whether this could constitute part of the antidote to the crass decision-making that we observe on a daily basis in many walks of life may still yet be a bridge too far but it is still important to hold on to positive aspirations, however unrealistic they may appear in practice!

8. The learning game

All change

The period over which I have been teaching, from 1979 to the present, 2019 at time of writing, has coincided with some of the most fundamental changes in higher education in the UK since its modern origins in the late 11th century. Accelerating developments in technology and communications indicate that pervasive change is now the norm, and stable more predictable conditions will gradually be blown away through persistent rather than episodic 'creative destruction'. These observations imply different and ever-evolving roles and responsibilities for students and staff. Opportunity recognition, empathy, managing uncertainty and understanding are rising as priorities in the skills set that students and staff need to embrace or at least accommodate more effectively. Didacticism will increasingly give way to immersion in our pursuit of learning.

First lecture

'A word of warning about the lecture theatre; the steps are alternatively small then large as you pass the end of each row on your way down to the front. Taking each step in turn will make you appear to be on the verge of falling over. If you choose to take every other step, all large or all small, you will be doing about 20 miles per hour when you hit the lectern. Definitely avoid using a mixture of the two! And remember, first impressions are critical in determining how the students view you, and the extent of their respect for your authority and intellectual stature in the future.'

Invaluable advice indeed when setting off to deliver one's first lecture! Luckily, I thought, the course I was about to teach had an intriguing title:-

'Constructing large-scale macroeconomic simulation models to explore the implications of different demographic trends and the limits to growth.'

I also reassured myself, several times during the previous week and at least six times the night before, that since I was only 24 years old and these were final-year students, at least there would be a natural rapport due to our closeness in age. My passion for the subject would be contagious and my light hearted humorous asides would prompt shared amusement. I had already addressed my main fear, that of 'drying', by writing the lecture out almost verbatim and in large handwriting.

After 10 minutes, virtually all of the one hundred or so students were sitting wall eyed and not a note was taken, either utterly engrossed or wondering when they could leave without appearing too rude. I sensed, correctly, that it was the latter. Desperate measures were required. I knew my purpose in terms of the knowledge and understanding that I intended to provide; the human race was, after all, in serious trouble. The students' priorities were rather different however, focusing as they did on the number of questions that I would set in the exam and their content. I found myself swerving from an explanation of the longer-term implications of exponential economic growth to a summary of course content and the structure of the exam. The effect was instantaneous and heart-warming, attention rapt and even a token, if slightly sympathetic, acknowledgment of my attempts at humour. I should have anticipated that an explanation of the imminent meltdown of the human race with clear evidence and arguments did not sit comfortably with light hearted banter, but I didn't.

Gathering my notes at the end of the class, a little earlier than anticipated there having been no questions, I asked two students who I already knew as I was their personal tutor, how they thought it had gone. Judging by their looks of surprise and slight confusion, they had not expected to be asked for their views. They paused to give the question some genuine thought and agreed that they found the subject interesting and unusual in that the content had contemporary relevance. Irrespective of whether they were being polite or sincere, I felt reassured. One last test remained; how many of them would turn up again the following week? Virtually all of them did, and this was either a testament to their interest or the fact that in terms of mathematical complexity this was probably the easiest section of their course.

Evangelism or objectivity

The rather cynical tone of the above is probably unfair on the students and my much younger self, but my overarching concern with what the students should learn and how best to ensure their enthusiastic engagement, was entirely genuine. Teaching in an area about which you hold very strong views, in my case the economic implications of exponential population growth and the limits to economic development, carries with it the risk that passion will override objectivity, transforming analysis into polemic and rationality to dogma. For a young budding economist the more traditional curriculum content would have been much safer ground. Proving that marginal cost must be equal to average cost at the minimum point of the average cost curve carries a much lower risk of bias and subjective distortion! I chose to teach both the conventional and the new.

My naivety in 1974 was to some extent excusable in that I had been given no advice or preparation about delivering lectures or tutorials. There was no internet, no peer mentoring, little if any student evaluation of teaching or even agreed best practice. Those who felt strong enough to be vulnerable might invite feedback from the students but many lacked the required confidence and resorted to the traditional approach of 'I explain, you take note'.

Didacticism versus immersion

Although, in 2019, lectures are often criticised as an anachronism from a different age, in 1979, having presented my first lecture, I began to appreciate their advantages as part of a teaching approach. The disadvantages of didactic learning and 'I explain, you take note' are obvious, but as a mechanism for communicating certain types of content, accepting that there will be little scope for discussion or questions, they can be very efficient in a resource-strapped environment and as part of a mixture of different learning approaches and group sizes. Unfortunately they can also be sadly funny if control is lacking. As indicated above, when I started lecturing in 1979 there was no significant or required provision in terms of training. In stark contrast to the qualifications needed to teach in schools, the only prerequisite for being a lecturer was a demonstrable understanding and level of

knowledge as reflected in publications and postgraduate degrees in the discipline concerned. The extent of an academic's ability to impart knowledge and understanding was effectively ignored.

In most cases the combination of the lecturer's commitment to sharing their area of expertise and the students' appreciation of the privilege of a university education, was sufficient to encourage an effective learning environment. With only five per cent of school-leavers attending university and lower contact hours, classes were smaller. Academics were tasked with making knowledge and academic discourse accessible for students to learn. Responsibility for determining the extent to which these opportunities were grasped in practice was left largely to the students.

As a student of economic history and economics in the early 1970s, I was hugely and cruelly entertained by the performance of some academics. One of the most knowledgeable was afflicted by a monotonous and disturbingly unidirectional delivery. Rather like a lighthouse, it was only apparent as the voice swept past. Being incredibly insensitive in the moment, I even took friends with no connection to economic history or economics into lectures just to entertain them. Another was so intimidated by the lecture environment that they just read their script and left. Others were brilliant! I learned a lot about lecturing, teaching and learning but possibly not as much as I could have about economic history and economics.

Stories of incompetence due to a lack of control and discipline within lectures were also legion. One of the most dramatic , and sadly not apocryphal, referred to a lecturer who, when greeted by a wave of paper darts, stormed out of the lecture theatre by what he assumed was an external door rather than via one of the exits at the top of the tiered lecture theatre. The door led into a broom cupboard. The students being relatively bright, realised his mistake and orchestrated sufficient noise to imply departure before settling down again to wait for him to emerge. When he furtively reappeared to check that the coast was clear, he was greeted by resounding applause, and more darts! Funny and sad, but true.

Arguments rather than information

Much of this rather arrogant approach had its origins in my own experience at university where I attempted to study whilst being fundamentally distracted by other more exciting pursuits. When

undertaking and presenting the requisite coursework and exam answers, although not purposefully, I thought that, as a student, I had developed a talent for identifying enough of the key facts and pieces of information needed to persuade others that I was well aware of the vast hinterland of knowledge that preceded my selective references to evidence. I probably fooled nobody except possibly myself, but I suspect that I was indulged because my essays were a refreshing change from the norm in that the reservoir of information on which I could draw was rather shallow meaning that I had to rely on argument rather than evidence. In contrast the essays of many of my peers were saturated with facts and references in an attempt, often justified, to demonstrate their wider reading and background research. Without realising, I had adopted the essay equivalent of 'lean manufacturing' in the belief that arguments delivered just in time were more persuasive than those where the message could be obscured if the delivery were cluttered with facts that anyone could assemble with a bit of effort, and this carried over into my approach to teaching.

It is in some ways ironic that we were all blissfully unaware of the wave of technology driven change that would reinforce the justification for adopting a leaner approach to evidence and facts and place a greater focus upon the quality of argument, analysis and debate. My tutor at university said of one of my final essays, that the arguments were sufficiently compelling to merit a high mark despite the almost complete absence of any hard evidence or facts. This gradual shift in emphasis away from fact based knowledge towards the quality of interpretation, understanding and comprehension had significant implications for teaching and learning with the need for a growing trend towards immersion in a subject rather than just an awareness of its content. It invites the now rather tired and overused maxim:-

I hear and I forget.

I see and I remember.

I do and I understand

Or as Einstein put it:-

Learning is experience.

Everything else is just information.

As observed above, we appear to learn most effectively through immersion, and there are many examples of successful interventions based upon experiential learning. Despite many initiatives, some of them my own, I sense that we are less successful when recognising and acknowledging the full panoply of what has been learned. This is partly explained by our natural curiosity to uncover the next unknown rather than dwelling reflectively on the past and present, but also by the ease with which learning consequences can be missed. By often labelling learning interventions according to their main purpose, be it, for example driving a car, or selling a product, attention is focused upon the goal of driving or marketing with little, if any recognition of the accompanying experiences that arise such as multi-functional coordination skills or understanding decision-making. Much of what is absorbed also defies clear identification because it involves tacit rather than explicit knowledge. In 10 years' time I may be looking back with amazement at how reflective and experiential learning have superseded formal curriculum design in terms of learning velocity. There may be much more focus upon understanding rather than explicit purpose when it comes to the directions that our students' experiences take, and their learning context.

A dose of imposter syndrome

I decided that I was probably more daunted by the prospect of my first lecture than many academics but it was still interesting and reassuring to discover that I was not alone. For whatever reasons, it had not occurred to any of my more experienced colleagues to mention that they too were nervous prior to delivering their first lecture and indeed still sometimes felt anxious before teaching. When asked about their recollections, however, they were much more forthcoming and shared with me how they too remembered the approaching event as a small dark cloud on the horizon, usually forgotten but suddenly swooping into consciousness with a gulp. Like me, some had endured a severe dose of what is now referred to as 'imposter syndrome'; at some point they would be rumbled and their cover blown, because they did not fit the conventional image of a learned academic. Whilst most people with any humility and self-doubt will suffer the occasional bout of imposter syndrome, my own experience was amplified by some of the differences between my approach to academic enquiry when compared to other academics with whom I worked. Whereas others appeared to absorb a broad sweep of knowledge and understanding alongside an impressive depth at the forefront of their particular area of research, I tended to be more opportunistic and pragmatic. The accumulation of

tacit knowledge through immersion in teaching and learning was more stimulating to me than the collection of facts; it seemed more natural and it sat largely outside the judgment of being right or wrong.

There is no doubt that a burst of imposter syndrome can help to generate the levels of humility so important to open-minded creative thinking, teaching and learning. There is also the risk however, that for some academics it will reduce confidence and self-esteem to the point where their outward credibility and authority begin to suffer. If the experience of imposter syndrome is both pervasive and persistent rather than transient, then the impact upon performance in both teaching and research may be negative and self-perpetuating. Performance through time would be expected to vary according to many factors from changes in mood, pressures from other activities and even the weather, but without persistent imposter syndrome it might be expected that these short-term fluctuations may resolve into oscillations around a longer-term more stable secular and positive trend. Imposter syndrome as a permanent feature, however, may undermine this stability and tip the secular trend into a decline that is not just self-perpetuating but also self-reinforcing as a consequence of the reactions of others, be they students or academic colleagues. Most of us learn, often with a bit of help, to break out of this spiral but it often requires significant levels of self-awareness and supportive discussions and mentoring from others. Casual observation suggests that the importance of creating and sustaining an environment that is conducive to support and mentoring may be under appreciated as we become more distracted by the pressures of an increasingly competitive environment and performance monitoring. There are, of course, others who desperately need a strong dose of imposter syndrome. It appears almost deliberate that they delay any acknowledgment of personal insecurity until later in their careers when their achievements are sufficient to allow a modicum of self-deprecating humility. They fail to realise how the transparency of their rather humiliating procrastination appears to those who know them well and indeed, may have been tempted to deploy a similar contrivance themselves, but declined out of pride.

A computing revolution

As Moore's law of computing power continued to prevail it fuelled the revolution in communications that is still transforming the way we live, and hundreds of years of hierarchical knowledge exchange models rapidly became obsolete with the advent of the internet and social networking. Information became commonplace and the quality of interpretation, judgment and understanding rose as priorities in curriculum design. These developments also transformed the scope for collecting student feedback through 'Student Evaluation of Teaching' SET, and the National Student Survey. This, in turn, enabled the incorporation of an individual academic's teaching performance in promotion procedures. This direct link between student perceptions of academic teaching ability, however crudely measured, and individual promotion potential, introduced the possibility of a more negative impact upon curriculum design. More challenging curriculum content might be removed or in some ways diluted due to a concern that their full inclusion may be less well received by the students which in turn might result in poorer Student Evaluation of Teaching scores. There was and still is the potential for a tension to arise between student learning and the academic's concern with performance measurement.

The significance of these tensions varies considerably according to the discipline concerned and the extent to which their underlying principles are considered inviolate. My own observations are naturally coloured by my area of teaching and research and the uncertainty surrounding many aspects of the subject content of creative problem solving, radical innovation thinking and entrepreneurship. In the natural sciences there may often be less need for self-doubt when supporting students' understanding of the principles that underpin their subject even though there remains an important and persistent debate, about the most effective way of conveying these principles. Disciplines that are not founded upon sets of agreed and proven principles are often subject to accelerating uncertainty in terms of appropriate curriculum content because the nature of work and employment is becoming more unpredictable and the skills and capabilities that our students will need to deploy in the future are less clear. Managing uncertainty becomes one of the enduring and most important capabilities that our students, and indeed staff, will need and upon which, increasingly, they will rely.

Exclusivity to inclusivity and performance measurement

The view that proven excellence in a subject was sufficient qualification in itself to teach in higher education became less tenable as the proportion of school leavers choosing to study for a degree,

and the number of places for them to do so, increased. Standing at around four per cent in 1950, this proportion is now approaching 50 per cent.

As perceptions of the role and purpose of higher education began to change, so the costs of mass rather that elite provision rose. The funding of higher education had to be justified by the return on that investment but capturing the financial returns in a meaningful way is difficult as is any attempt to quantify the skills and capabilities generated through higher education and the economic and welfare gains that they generate. Capturing these on a discipline specific basis is problematic enough, but if the wider learning that participation in higher education can provide is also included then any kind of metrics based approach will be far too crude a measure to deploy in practice. Sadly this won't necessarily prevent various vested interests, particularly some politicians, from including such measures in their arguments, however misleading and often compelling universities to join in; but more of this later..

Alongside these attempts at justifying mass higher education through the resulting economic and welfare gains, there arose a more positive supply-side focus by some, upon the skills and competences that students would need in their future careers to enhance their effective economic contribution and as a consequence, their value. Although modest in scale, as referred to earlier, this shift in focus was reflected in successive policy interventions that acted as a catalyst to a more widespread reappraisal of teaching approaches and their consequent learning outcomes. These coincided with a more general appreciation within higher education of the shifting emphasis away from academic content towards skills and competences and greater engagement with organisations in the public and private sectors to enable the practitioner input which this required. This in turn naturally prompted much debate and important consideration as to the appropriate balance between academic and applied study. Rapid change after many decades of curriculum and delivery consistency raised concerns about the impact upon the integrity and nature of degrees and the potential for these to be diluted , losing both currency and credibility as a consequence.

Higher education is delivered and received in a very competitive environment and most institutions will pursue a course of gradual incremental change at best, rather than embracing radical departures from the conventional wisdom.

From a Schumpeterian perspective, we are confronting a very effective dam that impedes a rapidly growing body of learning from realisation. Schumpeter would have predicted an inevitable dam burst of radical changes in approaches to higher education; the timescale and pattern of innovation are less clear because the sources of resistance are very strong but the rate of change in the environment is accelerating. This is not consistent with the timeframe required for carefully considered debate and explanation as a prelude to creating an atmosphere of pervasive trust between all those involved. At present we are moving in the opposite direction as is reflected by the growing obsession with repeated attempts to measure learning in order to be able to monitor the speed of progress. The multiplicity of opportunities, options and choices increases naturally as revolutions in technology and communications continue. This makes attempts at monitoring and measuring individual learning and teaching increasingly unrealistic.

If, after 10 years, I were to revisit this story of my personal experience of the evolution of the learning environment, what might or should I observe emerging over the decade as a continuation of changing approaches? Unpicking this question is very difficult because there are so many 'what ifs' in terms of students' learning needs, technology, inter-personal communication and effective interventions by teachers via learning platforms and environments. Personally, I can only cope with these complexities and prediction laden possibilities by retreating to my own experience of how we learn, the extent to which what we learn is deployed in practice and its impact.

Moving upstream

Just as, in certain areas of the curriculum, we are placing less emphasis on facts and information and moving towards a stronger focus upon understanding and interpretation, then the next natural direction will move further upstream to self-confidence, open-mindedness, humility and trust. Self-confidence is necessary for effective decision-making and consequent action as unpredictability and uncertainty generate larger numbers of choices. A more open-minded standpoint increases the number of options that can be considered, and humility is required to acknowledge our limitations and move further away from judgment and blame towards curiosity, analysis and understanding. All very easy to say from a position of relative judgment safety but less clear in terms of the implications for the curriculum or determining who should be responsible for initiating the changes.

Those closest to experiencing these rapidly evolving conditions, primarily our students, may be best placed in terms of understanding but less well equipped for designing curriculum interventions such as immersion and experiential learning. The transition from a largely passive role as recipients of the curriculum to more active engagement in its design may not sit comfortably with their current mind-set or their expectations. Similarly, many academics will resist relinquishing their influence upon curriculum content and delivery.

The growing requirement for new and fundamentally different educational programmes may be recognised and accepted by some academics and students alike, but there are very strong influences that will fuel resistance and even reverse the direction of change.

Metrics over substance

The present obsession with metrics in higher education reflects the desire by government and many leaders in higher education to maintain some illusion of responsibility and control. In practice the effect upon students and particularly academic staff is to encourage an atmosphere of suspicion and distrust just when the need to embrace radical innovation by all concerned, is growing. This natural retreat towards denial risks further ossification, greater rigidity and inflexibility in the curriculum at the same time as the potential for innovation continues to expand.

Measurement requires specification which in practice reduces the scope for imagination and radical innovation thinking. When specifications are reviewed and refreshed there is often turbulence as the adjustment process is intermittent rather than continuous. The system lurches to a new profile, settles down, and then lurches again. A smoother process of adaptations to practice has always been happening at the margins, but significant revisions to the core still tend, for entirely understandable reasons, to involve lurches rather than a smooth evolution.

The pace of change means that the luxury of a Schumpeterian explanation is no longer plausible because it includes a period of stability after the adjustment or correction. A new model embodying a

continuous flow of radical innovations is needed in order to deduce effective strategic responses and realise the potential progress that they generate.

At the severe risk of overthinking my analogy, there will be a pervasive culture of radical innovation thinking within our learning game when the dam starts to crack and the flow of innovation is a current. This implies a much greater level of flexibility and diversity of practice within higher education. There may be an undercurrent of persistent and accelerating potential radical innovations upon which to draw, but providers must still make choices and then adhere to these for a period of time in order to present a stable, well designed and organised platform on which students can learn.

As the range of options grows, there may be more variety in the models and approaches adopted, reflecting the different choices of providers and students. Adding virtual reality technology alongside artificial intelligence to the mix, opens the door to a realm of possibilities that is well beyond my grasp or experience.