



AI and the 4th Industrial Revolution

2016 has been a tumultuous year not least as a result of the UK's EU Referendum. Alongside this is the rapidly developing world of Artificial Intelligence and its application both to our personal social worlds and also the world of work. Along with Brexit, it has provided another rich seam of material for our blogs, collected here.

March of the Robots

AI and Robotics continue to fascinate and amaze – and cause concern. We commented in February on Richard and Daniel Susskind's work on the Future of the Professions, and recent news continues to reinforce their thesis.

Manufacturing has long been home to specialised robots, but the rate at which workers are being displaced is increasing. In China, Apple's key supplier Foxconn is replacing 60,000 workers with robots at its manufacturing hub, in Kunshan, Jiangsu province, cutting its workforce from 110,000 down to 50,000. Thirty five companies in the region spent a total of 4 billion yuan on artificial intelligence last year. Some commentators worry that these mass layoffs will cause further social unrest in China.

Home robots began with vacuum cleaners and lawnmowers, and these areas continue to advance: Dyson's 360eye has 360° vision and can tell where it has yet to clean. But now the idea of robots as companions is advancing. Asus's Zenbo is a voice-controlled companion, whose touchscreen face shows its emotions, can entertain kids and control the lights.



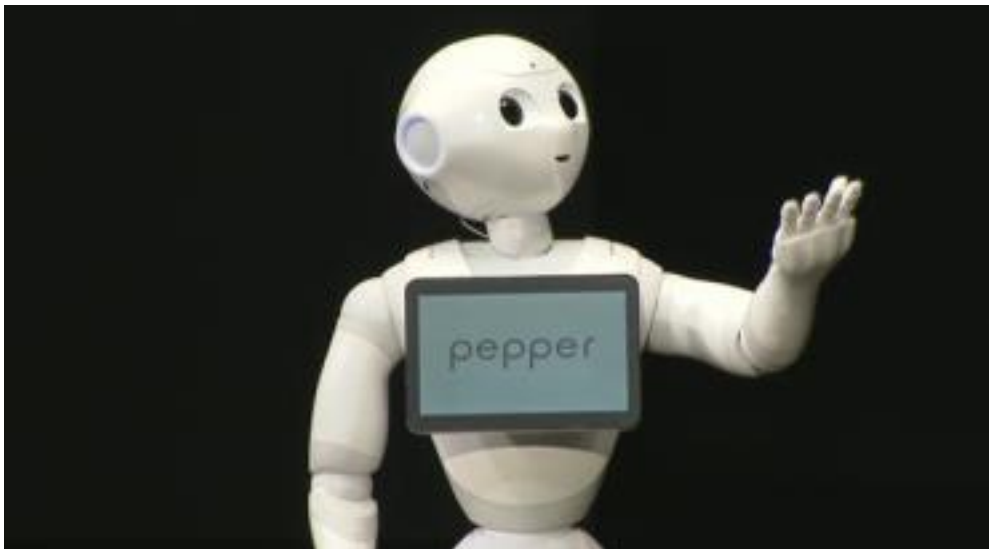
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Priced at \$599, it can help seniors enjoy a connected digital life and safeguard their health and well-being, be a fun and educational playmate for children, and a household helper. Zenbo can connect to and control many smart home and traditional devices. The company also launched 'Zenbo Developer Program,' an ecosystem aimed at developers that covers various domains, namely education, entertainment, healthcare, convenient living and smart home.

Softbank is testing [Pepper](#), a personal companion robot.

Even more humanoid and running on wheels, Pepper claims to be able to read emotions (not just emoticons!) and be able adapt his behaviour accordingly. It is being trialled in 140 SoftBank Mobile stores in Japan:



The whole area of elderly care is ripe for robots of this kind, including soft ones as the [FT reports](#). Professor Nadia Thalmann at the Nanyang Technological University in Singapore has built "[Nadine](#)", a very lifelike humanoid robot that can recognise people and starts up conversations based on previous chats. We may not be ready for this just yet, as several newspapers called her (sic) "creepy", but Nadine is probably the first of many. Japan is very advanced in this field: [Dinsow](#) for example has made a real impact, cheering up an 84-year old care home resident. Are there ethical and moral issues in here that we need to consider?

[Google has also unveiled a personal assistant](#) it says will let people control their homes, book movies, search the internet, ask follow-up questions about an Italian restaurant and sort through dog pictures using voice commands. Google Assistant's main physical form is a small, white, buttonless speaker called Google Home.

So what will be left for people to do? The Bank of England predicts that up to 15 million jobs are at risk of automation across the UK economy including professions such as law and accountancy. In response [Kenneth Baker's Edge Foundation](#) is calling for radical action to prepare young people for through education to develop skills that robots cannot easily replace – flexibility, empathy, creativity and enterprise.

Written by Huw Williams, SAMI Principal, published 22 June 2016.



The Fourth Industrial Revolution and the Future of Work – Part 1

Yesterday was the Fourth of July. Let's remind ourselves of the vision set out by the Founding Fathers in the US Declaration of Independence:

"We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness".

Noble sentiments indeed. Can they survive the impact of robotics and artificial intelligence on the world of work? Or can new technology actually enhance "life, liberty and the pursuit of happiness"?

On 22 June, Huw Williams' blog about the March of the Robots <https://samiconsulting.wordpress.com/2016/06/22/march-of-the-robots/> described some of the amazing new developments in the field of robotics, and the impact robotics is having in the world of work, citing the decision of Foxconn, Apple's key supplier, to downsize its workforce in China from 110,000 to 50,000.

The Evidence

Tomorrow, SAMI will be meeting in workshop session to develop its own scenario set for the Fourth Industrial Revolution, and we will be blogging the results of that in due course. Ahead of that, it's worth looking again at what might be happening. Here are a few points of evidence:

According to Frey & Osborne

http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf 47% of UK employment is threatened over the next two decades, but according to OECD, the figure is "only" 10% – that's still an awful lot of employment.

Experts seem to agree that the jobs most at risk are generally "routine" jobs: the FT's Employment Correspondent Sarah O'Connor, speaking yesterday at a Resolution Foundation Conference on robotics, commented that it would be no bad thing if some of the jobs she had witnessed were to be lost – for example in call centres and large distribution warehouses, in which employees are utilised as "human robots".

UK productivity has essentially flatlined since 2007. It desperately needs a boost. If robots mean that more output can be generated from the same amount of labour and capital, then wages can – at least in theory – increase.

Robotics will enhance our lives as well as changing the world of work: therapeutic robots are already in use and proving beneficial for people with alzheimer's (a growing disease in an aging population) and children with autism. "Nano swarms" are being developed, which will "swim" through the human body (even through organs, such as the liver) to seek and destroy cancer cells. As well as worker robots, there will be household robots, as Huw's blog described, and there will be games, toys and educational robots.

Developments in AI and technology will make us more connected than ever, and give us access to unprecedented amounts of information. In 5-10 years' time, most IT will be artificially intelligent.



Change is coming fast. Even if the overall impact is beneficial, there will still be massive disruption, and consequent impacts on the economy and society. Policy makers will need to understand and be more rapidly responsive to change.

Watch this Space

The Brexit referendum on 23 June showed once more the dangers of making forecasts without exploring the range of possible futures. Scenarios are safer. We will publish our scenarios following tomorrow's workshop. But there is enough evidence to suggest that there are grounds for hope and optimism as well as fear.

Finally, and returning to the land of the free, let's remember that there's nothing new about "robot rage". A headline in the New York Times ran "March of the Machines Makes Idle Hands".

The date was 1928.

Written by David Lye, SAMI Fellow, published 5 July 2016



The Fourth Industrial Revolution and the Future of Work – Part 2

In my blog of 5 July, <https://samiconsulting.wordpress.com/2016/07/05/the-fourth-industrial-revolution-and-the-future-of-work-part-1/>, I previewed SAMI's workshop on scenarios for the 4th Industrial Revolution.

The Key Drivers of Change

Looking forward over the next 10-15 years, it is clear that rapid technological advances will drive significant change in the way we work, as well as the way we live. At the SAMI workshop on 6 July, we started by trying to identify the most significant influences – the “key drivers of change” in this period. Among the ones we identified were:

- Generational differences – younger “digital Natives” will have very different attitudes, not only to IT, but also to work and organisational structures, and to how they share information online
- Faster turnover in IT skills – need for constant education and re-education
- Growing public awareness of the risks ahead – which will affect the take-up and use of new technologies
- Increased inequality and polarisation – with the benefits of technological innovation not spread evenly
- Artificial intelligence – AI's influence growing, due to AI machines' ability to “learn” from experience, and increase their autonomy
- Immersive communications – new ways of using and interacting with technology
- The effect of ICT – on all sectors of the economy, and the jobs and skills needed
- Continued growth of the knowledge economy – trading in knowledge and information rather than physical products
- Globalisation and blurring of political boundaries – likely to be increased by the ability of the knowledge economy to ignore physical boundaries and fiscal borders
- Potential impact of terrorism and war affecting European cities

Scenarios

We went on to look at some possible scenarios for the future. Starting from the European Union's current vision of the “Digital Single Market” – which envisages the EU, along with national governments improving digital access, designing “rules” for digital networks, and seeking to use digital as a driver for growth – we identified three similar, but slightly divergent alternative trajectories:



1. A world in which strong government chooses to foster innovation and entrepreneurialism through a slightly more “hands-off” approach, leading to a disruptive and fast-changing economy within a managed infrastructure, with new market entrants and new business (and social) structures encouraged in the climate of innovation
2. A more decentralised world in which governance and control is fragmented and/or delegated, and people have more choice and control over their own data, and alternate infrastructures exist
3. A world where political boundaries and organisations weaken, and big corporations have increasing power, with smaller, local economies existing within the big corporates’ infrastructure

What was striking in each of these three scenarios – although they were developed by separate groups of people – was the degree of commonality across all of them. In every scenario, some key characteristics were evident, including:

- The decline of traditional employment, and the rise of alternatives – self-employment, sessional employment, and the “gig” economy
- Growing inequality, with more wealth accumulating in the top percentiles of earnings distribution, and downward pressure on the middle percentiles – possibly leading to...
- greater social instability/loss of social cohesion
- The difficulty of raising taxes to fund traditional government activities in a global knowledge economy, working against the desire of governments to manage transition in order to maintain social cohesion

Next Steps

We now plan to take the broad scenarios from the 6 July workshop and apply them to specific sectors of the economy and society. We will begin by looking at Government. We will blog on each of these scenarios as we develop them. Watch this space.....

Written by David Lye, SAMI Fellow, published 27 July 2016



The Fourth Industrial Revolution and the Future of Work – Part 3

In my blogs of 5 & 27 July, <https://samiconsulting.wordpress.com/2016/07/05/the-fourth-industrial-revolution-and-the-future-of-work-part-1/>, I previewed SAMI's workshop on scenarios for the 4th Industrial Revolution, and reported on a workshop we held on the subject, <https://samiconsulting.wordpress.com/2016/07/27/the-fourth-industrial-revolution-and-the-future-of-work-part-2/>

The Road Ahead for Government

At the July Workshop, we asked participants what aspects of the 4th Industrial Revolution would keep the Prime Minister awake at night. We have gained a new Prime Minister since the discussion, but the issues have not changed.

First the Good News

The technological changes of the Fourth Industrial Revolution are potentially helpful to Government in achieving its aims:

- Technology will encourage globalisation and a knowledge and skills economy that may well flourish outside the confines of traditional trading blocs (and may indeed undermine them)
- Technology has the potential to improve the efficiency and effectiveness of health and social care systems – prevention of illness, helping people to stay healthy, connecting communities better; it will benefit other public services as well – enabling better services to be delivered at lower cost
- There will be a revolutionary change in defence and security systems, offering a “first mover advantage” to those who can make best use of emerging technologies
- The Fourth Industrial Revolution will reward those economies that are open, flexible, and have a skilled and adaptable workforce

But there's another side

Governments could find themselves increasingly powerless against mega-corporations – the Exponential Organisations described in Salim Ismail's book of the same name. Regulating the activities of these global behemoths (and raising taxes from them) may be beyond the grasp of a single country.

Citizens as well, either individually or in communities of interest, will increasingly use technology to seek greater autonomy, which will challenge the norms of government and wider institutions – for example blockchain technology could foster new approaches to banking and personal finance. Renewable energy may erode the dependence people have on the national grid for energy; and skilled and knowledgeable people will seek to develop technology and communications systems independent of the global giants.



If Government agencies, whether HMRC or NHS Trusts, are too slow to adopt new technologies, they will both fail to generate the efficiency gains needed to keep public services going, and damage the reputation of government. Already, doctors report that one of the most common complaints from patients is the inability to access wi-fi in hospitals and clinics. A tech-savvy population will have no patience with analogue public services.

If the disruptive effects of technology are too great and too rapid, or if the Government fails to mitigate them, then rising employment and inequality could lead to serious social unrest – especially if the middle classes, who have a vested interest in the status quo, suddenly find that the status quo is working against them. In the most extreme event, when the middle classes turn on the Government, revolutions can happen.

So What is to be Done?

The Government needs to address four areas:

- Understanding the future – knowing what the opportunities and the risks ahead are, and their application to the World, to the UK, and to the specific workings of government. Parliamentary Committees have for a number of years been pressing Governments to up their game on horizon scanning; the advent of the Fourth Industrial Revolution is a significant additional pressure on Government to become future aware.
 - Is the Cabinet Office’s Horizon Scanning Unit in the right place and adequately resourced to ensure this?
 - What lessons can be learned from other governments and from other sectors?
- Ensuring that the UK has the infrastructure in place to benefit from the enormous advantages of technological change, and addressing the risks of cybersecurity – whether criminally or politically motivated: the Government needs to be an enabler of change.
 - How can Government get this focus – at national and local level, and in its service-delivery arms as well as policy?
 - As accountable officers for agencies that deliver services, what expectations should Permanent Secretaries have of the rate of change and adaptation in those agencies?
- Understanding the potential impact of changes on the role of government, the extent of government, and the relationship between individual citizens and companies and other organisations in the future – including, critically, the scope for government to raise revenue through taxation – the UK has an analogue system of government, built largely on a template designed by Haldane in 1918.
 - What would digital government for a digital age look like?
 - Can the Government connect digital platforms to the existing structure, or is more radical reform needed?
 - What skills does Government need, and how can it get them in the most cost-effective and sustainable way?
- Maintaining social cohesion at a time of potentially major disruption – for example instability in the labour market, and significant changes in wealth distribution – the riots of 2011 showed how quickly instability can spread (and digital communications certainly accelerated this). If the models of Osborne and Frey of



the Oxford Martin School are anywhere near correct in stating that 47% of current UK jobs will be at risk, this presents a massive social challenge. Even OECD's "more conservative" estimates of about 10% of jobs being at risk presents a major problem for national and local governments to manage.

- What role does Government need to play in managing through the inevitable turbulence the 4th Industrial Revolution will bring?

The Government will need to address these areas within the context of its other activities and priorities – including redefining the UK's position in the world post-Brexit, gearing up health and social care systems to meet the predictable challenges of an ageing population, defence against both terrorism and hostile states, and achieving economic growth.

Written by David Lye, SAMI Fellow, published 31 August 2016



What does the 4th industrial revolution mean for strategic consultancy?

The 4th industrial revolution has many definitions – what we are using it to mean is:

- Smart & connected machines and systems, PLUS...
- ...Waves of breakthroughs in other areas, eg:
 - Gene sequencing
 - Nanotechnology
 - Renewables and storage of energy
 - Quantum computing
- "It is the fusion of these technologies and their interaction across the physical, digital and biological domains that make the 4th industrial revolution fundamentally different from other revolutions." (Klaus Schwab: The 4th Industrial Revolution)

What do strategic consultants do?

Strategic consultants may specialise in IT, HR, law, finance, marketing, M&A or foresight, but the essential roles in relation to their client organisations are generally thought to be fourfold:

- **Thought leadership.** This was defined in the late Laurie Young's book (<https://www.koganpage.com/product/thought-leadership-9780749465117#>) as "the deliberate creation of ideas to help businesses succeed," This is the province of management consultancies and gurus, who provide a conceptual or organisational framework to help their clients think about their strategy. The competition for mindshare through thought leadership is extensive and deep, and there are algorithms to measure the quality of the messages and their articulation.
- Providing an **unbiased partner** of sufficient seniority and experience to facilitate discussions within the organisation. This is much harder to evaluate but may have more value to the client than eternally provided thought leadership
- Support organisations by bringing **deep industry or other knowledge.** Of increasing importance is the role of experts from other domains to the client organisation who can use parallels with the industry of the client, or can introduce ideas about the directions from which change – threat or opportunity – may come: providing a backdrop to the formulation of thought leadership. This type of deep knowledge is important during the data gathering/horizon scanning stage of the strategy cycle and may also contribute to Sense Making and "Setting Priorities".
- **Implementation** – when client resources constrained or inexperienced in type of project, or when there is a need for efficient, effective "horsepower" able to manage organisational politics



The strategy cycle is at <http://samiconsulting.co.uk/825samiannivslides.pdf>

How will these roles change due to societal and economic factors?

Some of the forces at work on aspects of strategic consultancy include:

Thought leadership becomes more important with the increased influence of the virtual world and social media, leading as it does to wider coverage of ideas.

Unbiased partner becomes more important as strategy moves in many cases to division or business unit level. Here the managers are often MBA informed and have expectations of sharing sources of advice; they are used to thinking about data correlations. However these managers are often asked to think strategically as just one of their portfolio of responsibilities: and strategy loses out to more “urgent” tasks. As a counter to this the role of the unbiased partner is to provide legitimacy to time spent on strategy, and reputation to frame senior level discussions.

Bringing **deep industry knowledge** of the companies domain: this is reducing in importance for two reasons: first, the wide availability of services for competitive information by industry or geography; second, the volatility of industry boundaries as the 4th industrial revolution sweeps in behind the second and third. Experience across industry sectors is increasingly important.

Implementation: an increased role as central strategy units are small if at all, and time there is often seen as a training or development stage of a career.

How will this change due to 4th industrial revolution?

Thought leadership: the main new factor is the need for strategy consultants to be able to think “in the new world”. This requires judgement to mediate between hype and “it will never happen”.

Unbiased partner: the partner will increasingly use social media and analysis tools to provide support, backed up by virtual meetings. Effective communication at a distance is facilitated by shared values.

Deep industry knowledge: this is increasingly being mediated by search engines, and is the area which will be most affected by augmented and machine intelligence.

Implementation: during implementation it is often to introduce new tools into an organisation – these are increasingly IT enabled, and will become more so as machine intelligence reaches more corners of work.

*Written by Gill Ringland, CEO and SAMI Fellow and David Lye SAMI Fellow.,
published 28 September 2016*