



Technology and AI

During 2018 more new technologies emerged and there was growing interest in, as well as concern about, AI (Artificial Intelligence). Over the year several of our blogs looked at what new ideas were in development and what the impact of AI might be.

What's Hot in technology: 2018



Looking forward into 2018 here are the thoughts of David Smith, Chief Executive of Global Futures and Foresight and SAMI Associate. He is always worth listening to on technology futures, so we post this as the first of our 2018 blogs.

Hashgraph

Blockchain will undoubtedly create waves in 2018 and beyond, from the Bitcoin express through to practical uses in smart contracts and across countless industries. This is not to suggest that this new technology will not in time be supplanted itself by competitors offering improved features. **Hashgraph, for example, claims to work at 50,000 the speed of blockchain, whilst proving mathematically fairer and using less energy.** 2018 will see an explosion in rival technologies underpinning new cryptocurrency and ledger systems.

Shoppable social

The lines between retail, social network and entertainment will blur to an even greater extent in 2018 than we have seen thus far. **Amazon has already launched a shoppable social network called Spark** whilst **Buy+, a Chinese virtual reality shopping experience backed by Alibaba,** engaged over 8 million users within a week of launching.' Social video, and other virtual interfaces, could represent the future of retail since 2019 is expected to see **video comprising 85 percent of net traffic and 50 percent of commerce arriving via mobile.**



Data becomes toxic

Data competency has already ordained winners and losers and in 2018, it will continue to do so, albeit from new perspectives. Data volume will overwhelm all but the most prepared since average human knowledge is doubling every 13 months – **meaning, within a couple of years, the total information volume may double every 11 hours.** Allied to volume is a common vulnerability in many data models. Many lack explicit consumer consent – especially via apps, and few have equivalent to ‘key facts’ in financial services. As consumers realise the value inherent in their data, the unspoken legal risk in data models will upend all but the most prepared. What data we hold and how we use it will be the life and death of our companies.

Employees+

Perhaps with an eye towards automation or else simply improving their marketplace standing, **70 percent of employees say they would consider mind and body-boosting treatments if it improved their job prospects.** Although futuristic sounding, smart drugs such as modafinil are already reportedly widespread in academia, industry and beyond. HR policies may need revisiting to place guidelines for brainhacking and other routes employees will be seeking to gain an edge.

Self-inflating structures

With housing shortages contributing to acute market misalignments in some advanced economies, and the need for ‘insta-infrastructure,’ following catastrophes around the world, a new built form paradigm is required. Furthermore, companies will increasingly value flexible solutions to their office space issues. 3D printing already provides a platform for addressing these issues. In 2018, more tech-based solutions will appear to compliment it, such as MIT’s self-inflating structures project that works as a **‘...functional tool for things such as distributed assembly processes, transportation of goods, emergency response and architecture.’** Flexibility in the built form could radically redraw the economy; in 2018 we expect proto examples of this change of direction to hit the headlines.

Interaction 4.0

The way we will buy, build and use technology is changing rapidly, which means the teams and ecosystems that build it and run it will need to change too. Designers should be especially cognizant of this. In 2016 mobile net use overtook computer net use, whilst by 2020, **‘...50 percent of all searches could be voice searches, and around 30 percent will involve no screen whatsoever.’** VR, holograms, AR and haptics will all feature; 2018 will see the omnichannel become a lot more crowded.

New consumer industries (from colliding technologies/industries)

Consumers **‘...demand experiences, not just products, and have become active participants at every stage of the value chain.’** In many cases this erodes industry boundaries and creates new markets at the intersections of collision, such as wellbeing where health, wellness and beauty collide. There is no one single technology that is singularly driving this Hot trend; rather the realisation that B2B2C markets are



reconfiguring into delivering desired consumer outcomes. How to organise for this – in terms of aligning organisation structure to technology provision – will be key.

Photonics

As an intermediate step on the path to quantum computing, photonic computing could provide the ‘...**same accuracy as the best conventional chips while slashing the energy consumption by orders of magnitude and offering 100 times the speed.** By 2020, **larger systems capable of achieving multiple Exaflops are forecast to arrive.** That would enable even handheld devices to have AI capabilities built into them without outsourcing the heavy lifting to large servers, something that would otherwise be next to impossible.’ All data could therefore be processed in near real-time, at the edge of networks such as the IoT. IT strategies, consumer behaviour and the architecture within which to operate would all shift as a result, some in unpredictable ways.

Personalised analytics

With McKinsey estimated around a third of the current CEO remit is already outsourceable, and examples of mass automation of management roles already appearing with hedgefunds and beyond, 2018 will see a clamour from professionals seeking to future-proof their roles. Ironically, A.I may provide an answer. ‘**Personalized analytics (will) become mirrors and lenses for refocusing professional effectiveness,** says MIT research fellow, Michael Schrage MIT research fellow. ‘Michael envisions selvesware serving the role of **a perpetually present leadership coach providing real-time advice on executive behaviour.**’

Machines have their own bank accounts

There can be little doubt that widespread automation brings about a raft of societal and ethical questions. Hitherto fringe ideas will gain currency as the automated economy takes hold. The rights of robots to the fruits of their own production may become one such issue in the near future. The Commonwealth Bank of Australia is reportedly looking into the implications of a future in which ‘...**machines have their own bank accounts and pay for replacement parts and engineers to service them,**’ whilst the European Union has already called for ‘**the consideration of a Civil Law Rule of Robots**’. Intellectual property rights could flow from this, suggesting machines could become their own economic agents in the near future to a degree currently considered unthinkable.

Written by David Smith, Chief Executive, Global Futures and Foresight, [published 3 January 2018.](#)



AI and ethics – event review

This is the first of two blogposts by Huw Williams about the Law Society event on “AI and ethics”. It covers the Opening Address by Lord Clement-Jones, and the Keynote Address by Professor Richard Susskind. The second blogpost will cover the three panel sessions and the closing remarks by Christina Blacklaws, Vice President of the Law Society.

At the end of April, the Law Society organised an “AI and ethics” event, hosted by Hogan Lovells in their modern lecture theatre in Holborn. The timing was very pertinent, as the previous day the Government had **announced** an **AI Sector Deal** worth almost £1 billion, including almost £300 million of private sector investment and 1,000 new government funded AI PhDs. And a week earlier the **House of Lords Select Committee on Artificial Intelligence** had published its report on AI, including some 78 recommendations.

The Opening Address in fact was given by **Lord Clement-Jones**, the chair of the House of Lords Select Committee on AI. In the time available, he wasn’t able to go into much detail about the report and its recommendations – we may review the full report in a future posting. But he did stress that the UK was well-positioned to lead the debate on ethical AI, because of its history and contacts. He argued that it was important not to stifle the development of novel AI systems through over-regulation, and so they were looking instead to ensure an ethical dimension in the actions of existing regulators, like Ofcom. He also noted that AI systems were already operating, so there was no time to waste.



He spent much of his time covering a new recommended 5-point “AI Code” with the aim of it being adopted nationally, and internationally:

1. Artificial intelligence should be developed for the common good and benefit of humanity.
2. Artificial intelligence should operate on principles of intelligibility and fairness.
3. Artificial intelligence should not be used to diminish the data rights or privacy of individuals, families or communities.
4. All citizens should have the right to be educated to enable them to flourish mentally, emotionally and economically alongside artificial intelligence.



5. The autonomous power to hurt, destroy or deceive human beings should never be vested in artificial intelligence.

These sound very worthy and sensible points, but the more one looks into them, the more the difficulties emerge:

1. In a capitalist system, how can one ensure “common good and benefit”?
2. Artificial intelligence often lacks transparency (a point much debated later), so it may be hard to ensure intelligibility or guarantee fairness.
3. The Cambridge Analytica scandal has already highlighted how hard it is to manage a sensible line on data privacy.
4. Education is clearly a vital need, but will it be funded? Lifetime learning will be essential, as the world of work is transformed.
5. Several automated weapon systems **already exist**. The Phalanx close-in weapons system, aboard the amphibious assault ship USS Boxer, is essentially a large machine gun that can detect and automatically destroy anything coming its way.

The Keynote Address was given by **Professor Richard Suskind**, joint author with his son Daniel of the book “**The future of the professions**”.



He said that he would primarily concentrate on “narrow AI”, rather than “artificial general intelligence”, but even then significant developments are already happening. Commentators often over-state the impact of new technology in the short-term, but under-state it in the long-term (say 10 years for AI). He stressed that in assessing which areas of human thinking AI could replace, people often argued that the human method of thinking could not be mimicked. However, all that is required is for the narrow AI system to achieve the same or better outcome. An autonomous vehicle for example would not have a humanoid robot sitting at the driving wheel. Furthermore, when you delve into experts’ explanations of why they took a decision, it often comes down to intuition or judgement – even they are not fully “transparent”. The AlphaGo system which beat the world Go champion made a move which experts thought at first was a mistake but in the end they described as “creative”. The inductive nature of machine learning makes transparent explanations impossible. And a narrow AI system doesn’t “know” anything – AlphaGo didn’t go out celebrating with friends after its win!

Turning to ethics and meta-ethics (how we build ethical systems), he said that ethics were “normative” (what *ought* to be) rather than objective (what *is*). Can anything be argued to be objectively right or wrong?



He ended with four concerns:

1. Is there an existential threat to the human race from AI? Bill Gates, Elon Musk and Stephen Hawking have all suggested there could be. Susskind suggested reading Nick Bostrom's book "**Superintelligence**" on the subject. Personally, he felt the possibility was very far off, but AI would have major disruptive societal effects well before then.
2. Are there moral limits to decisions we should let AI systems make, even if they could? Would you want an AI doctor deciding to switch off a life support system? An AI judge passing a life sentence? A death sentence? How do we establish where the "no-go" areas are?
3. What will happen to the future of work? Will change come so quickly that we face technological unemployment, or will enough new jobs be created to offset those lost?
4. What effect will there be of AI ownership and control? Income will be a return to capital rather than labour, likely to increase societal inequality – it's concentrated already, but will become more so. Does this call for new forms of re-distribution?

Being an optimist, Susskind suggested that new developments in the **Centre for Data Ethics and Innovation**, and the **Nuffield Ada Lovelace Institute** would help us move towards some answers.

With a tight agenda, so there was only time for one question. An AI entrepreneur asked whether we needed to worry about AI-equivalents of Greenpeace resisting "progress". Susskind replied that balanced sensible debate would make sure good ideas weren't crowded out. To my mind, this highlighted a more fundamental question – whose ethics is it anyway?

Written by Huw Williams, SAMI Principal, [published 16 May 2018](#).



AI and ethics – event review part 2

*This is the second of two blogposts by Huw Williams about the Law Society event on “AI and ethics”. The **first** covered the Opening Address by Lord Clement-Jones, and the Keynote Address by Professor Richard Susskind. This blogpost covers the three panel sessions and the closing remarks by Christina Blacklaws, Vice President of the Law Society.*

The Opening Address gave a brief overview of the House of Lords Select Committee on Artificial Intelligence’s **report**, in particular highlighting a recommended AI Code. Professor Susskind’s talk raised several issues of concern, notably whether there are “no-go zones” where AI systems should not be used, and the discussion raised a deep question of “whose ethics is it anyway?”

Susskind was followed by three panel sessions. The **first panel** addressed the question of how to develop a multi-disciplinary approach to AI. The audience apparently represented a wide range of disciplines, not just lawyers, and the idea was that diversity of this kind was essential for any debate on ethics. The panel itself covered academia, consultancy, developers and government. Issues raised included:

- How to measure the performance of an AI system: are we content with a system which relies on a good average performance? Or are we concerned about its worst performance? Or its performance in non-standard cases? Maybe it depends on what the system does – occasional bad performance in film recommendations may be tolerable, whereas in cancer diagnosis it might not be.
- The debate on AI should be conducted in language all could understand – quoting a Sun headline – it needs to be a comprehensive debate if it is to engender public trust.
- How people in Japan appear to be more accepting of robot technology, even in personal care settings.
- How the new **AI Sector Deal** offers new opportunities for the service sector.
- In the Q&A session, discussion covered:
 - how to help Boards and technologists communicate the risks and values; how to establish ethical review boards that engaged at the development stage;
 - how, given that AI systems are already out there, ethical development can keep up; the lack of transparency of the AI “black box” was seen as a major concern; how with a lack of transparency there at least needed to be accountability;
 - how ethics boards ought to be constituted – lawyers, technologists, consultants!



The **second panel** addressed the topic of the role of global standards and regulation. We could use the concepts of liability that apply to other products – had systems been developed with “reasonable care” and “due diligence”? It was important that developers demonstrated that they had understood the data which the system used – to what extent was it biased? What were its limitations eg when applied to different ethnic groups? The IEEE has crowd-sourced the views of 250 “global thought experts” to produce guidelines for “**ethically aligned design**”, based on principles of human rights and wellbeing.

One panellist, Patricia Christias of Microsoft, argued that their designs were based on “timeless values” of:

- Fairness and diversity
- Privacy
- Safety and reliability (planning for unintended consequences)
- Inclusivity; and,
- Transparency and accountability.

The Q&A session soon challenged Christias’ view. Were there really universal, timeless values? This surely is a fundamental point – views on slavery, gay marriage and meat-eating will vary over time and between cultures. If much AI development is done in China, does that mean that Chinese communist orthodoxy is intrinsically built-in? How would Jewish and Muslim traditions be accommodated in an AI coroner system? Whose ethics do we give preference to?

Other questions covered:

- Transparency: to what extent was it possible? Was it a fallacy anyway? Should the “editorial policies” of algorithms be as obvious as those of newspapers?
- How can we ensure higher levels of digital literacy? A better understanding of the context of data?
- Can we build greater values of responsible research? Would people be prepared to pay more for systems labelled “ethics inside” like they do for organic food?
- Do we hold AI and people to the same standards? Or stricter ones?
- Two developers were concerned that they were already providing AI systems which hadn’t been through any ethical vetting; we need to get on with this.

A key element of the response was the notion of “trustworthiness” – some sort of certification process like for airplanes – where probability of failure is not zero, but at an “acceptably” low level.

The **final panel** was chaired by Christina Blacklaws, the Law Society Vice-President and President-Elect. Its topic was “No-Go and Must-Go Zones” – are there any solid absolutes in this area?



The first panellist advocated a political process akin to Human Rights Treaties and building ethics in to AI curricula, with professors in different countries adapting the courses to local cultures. Boards must be educated too; we needed certification bodies and regulators; and developing countries should be engaged too. She called for a Global AI Council, probably under the UN. In other words it was a political discussion rather than a technical one.

Other panellists argued for:

- “critical active engagement”, a combination and human and machine learning approaches, as a way of navigating differing ethical values
- Transparency and open data – eg incentivised in some way. He challenged the assertion made earlier in the day that film and book recommendations were somehow of less concern – filtering news and cultural exposure led to self-reinforcing “bubbles”, reducing debate in society.
- Current case law as a good base, more proactive regulators and “must-go” education – teach philosophy to primary school children.

Summing up the morning, Christina Blacklaws highlighted:

- Multi-disciplinarity and inclusiveness: all views were needed
- Trustworthiness: to avoid a public reaction like that to GM foods
- Whose values, at what time? Only political debate could resolve that.

Congratulations to the Law Society for arranging such an intensive, intriguing and thought-provoking morning. Let’s hope that these initiatives and ideas are able to keep up with the pace of technological change. It’s clear the House of Lords report is just a first step in this process.

Written by Huw Williams, SAMI Principal, [published 23 May 2018](#).



Nesta FutureFest Forward: AI and The Future of Work, May 2018



We recently attended a Nesta event on **AI and the future of work** which was the second of the precursors to this year's **FutureFest Forward** (scheduled for 6 and 7 July 2018). With 3 speakers and an MC, this event aimed to explore, and rediscover, how we will approach work in the 'new world' of increased automation and AI. Each speaker put forward their ideas and visions of what might be and then discussions were opened up to the audience in the form of a Q&A session.

Charles Kriel, the chair of the session, introduced the topic with some thoughts about dialogue, Google's digital assistant and how making bots understand us likely to change our language which means that AI will be shaping our discourses over the years to come.

The first speaker was Rachel Higham, Director of IT at BT where they have been using, developing and supplying AI for over 8 years. Their use has included scheduling field engineers' appointments; managing nuisance calls as well as other cybersecurity areas and has led them to understand how careful we need to be in deploying AI. After all data analysis and machine learning are dependent on where the data originates so can easily spread bias. As customers begin to question this data and its use, organisations will need to become increasingly transparent around AI and its implementation. There is a growing need for all of us, not just organisations, to think about governance and the necessary ethical frameworks for the use of AI – as it's rather like a child in terms of its ability to make decisions so these do need to be monitored. Clearly AI has huge potential yet brings with it a huge duty of care and issues around trust.

Dr Phoebe Moore, University of Leicester, was our second speaker and reminded us of John McCarthy's definition of AI – the science and engineering of making intelligent machines. This indicates that, as development continues, machines will become autonomous and not require human intervention. It also means that robots have to learn continually, and create symbols, to help themselves understand processes by which the world operates whereas for humans the world just 'is'. Nowadays data can



come from just about anywhere and be digitalised so enabling technology to measure increasingly intangible things leading, in some cases, to human profiling. A recent International Labour Organisation report has identified risks associated with such people analytics where the use of algorithms and the automation of offices has led to an overall deskilling and the replacement of jobs. This is beginning to move into the area of non-routine jobs and the use of 'big data' to make judgements. Again we heard that ethical and related issues will need to be addressed.

Our final speaker was Harry Armstrong from Nesta who brought in some other topics and reminded us that there are other things shaping the future of work. These include, amongst others, demographics, globalisation and geopolitics. Alongside this we also need to find better ways of dealing with AI and ensure we bring aspects of foresight and futures into the debate, for example can we create sensible labour market intelligence. We also need to accept that automation is coming and will happen to us as 'science finds, industry invents and humans conform'. One key point, though, is to remember that we have agency over these things and through high performance work practices, and organisation design we can have a huge impact on how the coming work disruption will affect our lives and structures. We will have to find ways of functioning in and out of work in such a new world and also find ways of dealing with possible mental health issues as work may no longer define us as individuals.

These three thought-provoking presentations led us into a wide-ranging Q&A session where we discussed privacy as a human right, the need for an ISO in the area of AI, the recent setting up of the Centre for Data Ethics, how we can become more transparent in the use of data and the difficulty of explaining how data is collected and used because, at the moment, this seems to be very much a 'black box' process. Other topics raised included the need for interactions with everyone who gives their data not just companies and governments, how we can value the 'human skills', whether we are looking sufficiently hard at the philosophical side of the issues and whether the acceleration of AI increases the divide between the 'haves' and have-nots'.

As you can see from this list of issues – which is not exhaustive! – the debate was extremely divergent and reached no particular conclusions. The session could probably have continued way into the night had not the prospect of a glass or two of something suitably celebratory been proffered. All in all, a great warm-up for the immersive installations and inspiring talks planned for **FutureFest Forward** in July.

Written by Cathy Dunn, SAMI Principal, [published 7 June 2018](#).



Disruptive technologies?



VC company **Tällt Ventures** brought together a panel of judges from Microsoft, Google, Uber, Sainsbury's and others under the banner of "**Disrupt 100**" to select the start-up businesses "with the most potential to influence, change, or create new global markets". Innovations that had a social benefit were particularly highlighted. They tackled this challenging task, grouping contenders together in themes:

- Social impact enterprises
- AI
- Biotech
- Space tech spin-offs

Many investors are now looking at the **social impact** of businesses as a KPI. Examples on the list include:

- **Jupiter** Intelligence which provides a tool for urban planners to assess flood risk using real-time satellite data and machine learning to assess the effects of climate change, rising sea-levels and erosion
- **Callisto** is a platform for college students to report unwanted sexual harassment; now being extended into workplace versions
- **Flow Neuroscience**, a personal medical device that treats depression by stimulating and suppressing parts of the brain using very weak electrical currents.
- We've seen many developments in **AI** in recent years and the judges saw these having a real impact very soon. They selected:
- **Sophia Genetics**, providing enhanced genomic diagnostics, specifically for cancers
- **CallSign** uses AI to build a picture of the user and trigger an alert if it detects unusual behaviour.
- **Textio** is an "augmented writing" platform helps recruiters improve the content of their postings and changes the way businesses use language. Small tweaks can change the appeal of an advert and targeted to specific groups: in one case the female response rate increased from 10% to 57%.



Biotech has long been one of our megatrends. In this category the judges were looking at those developments that would support sustainable consumption.

- **Memphis Meat**, which produces lab-cultured meat thereby reducing water use, and includes amongst its backers Bill Gates and Richard Branson
- **Algiknit** is developing a sustainable “BioYarn” that can quickly biodegrade after its use-life is over using alginate, a biopolymer derived from kelp
- **Envigreen Biotech** produces starch-based substitutes for plastic bags that are 100% organic and recyclable; some of the inputs are vegetable waste bought from farmers in southern India, thereby also providing a boost to the local economy.
- **Douxmatok** is looking to change the way we taste sugar, making it more potent so people consume less of it – ideally, around 30% less. A “drug carrier” transports the sugar molecules directly to the body’s sugar receptors enhancing its impact.
- The fourth category was rather anomalous: “***unfathomable science***”, mainly space technology spin-offs. The highlights were:
 - **General Fusion** are developing fusion energy called Magnetized Target Fusion (hydrogen atoms fused together by heating to high temperatures); fusion energy could be relatively cheap, and of course doesn’t produce greenhouse gases.
 - **Zero Mass Water** have developed hydro panels to produce water using only sunlight and air from the natural humidity – a huge benefit in water-starved areas and refugee camps.
 - **EnergyNova** design and manufacture longer-lasting hydrogen-fuel batteries which overcome the limitations of lithium batteries.
 - **Axelspace** uses 50 satellites to take pictures of the world every day and is building a space data API for anyone to use; applications are boundless.

The range of innovations on the list is startling – from nano-technology satellites to portals that use no water and convert waste into energy; from automated quantum chemistry to “increasing pregnancy possibilities via smartphones”!

But what I found interesting was that so many innovations targeted at social benefit are seen by a VC firm to be serious investment opportunities. Maybe this signals a change in corporate priorities.

Written by Huw Williams, SAMI Principal, [published 4 July 2018](#).

NB: none of the above represents an investment recommendation by either Huw Williams or SAMI Consulting.



Artificial Intelligence and The Legal Profession



The Law Society has published a report on [AI and the Legal Profession](#) with input from SAMI Consulting. The Law Society's research team used the Horizon Scanning tool [Futurescaper](#) to store their scanning hits, and SAMI used its analytical capabilities to help structure the report.



After an introduction which reviewed the nature of AI systems generally and assessed their current state of development, the report covers areas of application in the legal profession identified by the horizon scanning. These included:

- Document analysis: drawing key conclusions, especially for due diligence
- Contract intelligence: using machine learning to scan documents and produce a risk visualisation
- Document delivery: a chatbot that provides consumers with privacy law information and generates a compliance policy
- Legal Adviser support: based on IBM Watson, a system reviews the relevant laws, draws inferences and provides candidate answers to various questions
- Clinical negligence analysis: a decision support system that reviews similar previous cases and their outcomes
- Case outcome prediction: predicted outcomes of European Court of Human Rights cases with 79% accuracy
- Public legal education: helping the general public understand the law better, notably in divorce cases.



The report then addresses the potentially far-reaching implications of the application of AI in the area of law.

Firstly it looked at the impact on ***the number of legal jobs***. In their book "***The Future of the Professions***", Susskind and Susskind predicted that a wide range of legal jobs could be replaced by AI systems. Not all commentators agree, but the suggestion that the impact on entry-level solicitors could be large is quite common. But if that is the case, where do the senior solicitors of the future come from?

This leads on to an impact on the ***types of legal jobs*** and the skills required. The need to relate to clients and assess the real nature of a problem becomes more important than knowledge of the law itself. Also, clients will increasingly use AI systems themselves to reduce complexity and ambiguity – two reasons for consulting lawyers in the first place. Conversely, new roles will emerge in operating and understanding AI systems, and in addressing issues of liability their application might raise. Consequently, the whole area of skills and legal education training will need substantial revision, as other drivers such as changing generational attitudes will impact as well.

There is then the impact on ***organisational structure and strategic planning***. Recruitment and succession planning need to change, and a new role of Head of AI may be needed. Machine learning could also identify new opportunities and growth areas in the market itself.

But for many, the key impact is ***lower costs and changing fee structures***. Entry-level solicitors could be replaced entirely, and more highly skilled solicitors can be freed from routine tasks to spend more time negotiating agreements. Lower costs in turn could open up the market to those who could not previously afford legal advice, increasing the value of the whole market.

The final section of the report looks at how AI systems could themselves raise legal concerns. Areas covered include:

- Transparency: AI systems learn from data, so are self-organising and their conclusions not easily explained; yet transparency is a basic principle of justice.
- Ethics: the Law Society addressed this area in a recent conference, which we reported on in two blogposts [here](#) and [here](#).
- Liability: as AI systems interact with many sources of data from the Internet of Things assigning liability becomes difficult.
- Electronic personhood: the EU has already begun to consider whether sufficiently advanced systems should be given personhood, with rights and responsibilities analogous to corporate personhood.
- Public acceptance: just like GM crops, vaccines, and nuclear power in previous generations, there could be increasing public disquiet about the application of AI to sensitive social situations.

The report concludes: "Over the next few years there can be little doubt that AI will begin to have a noticeable impact on the legal profession. Law firms and in-house legal departments have opportunities to explore and challenges to address, but it is clear there will be change".



For those interested further, the report has a very extensive list of references, the output of the research team's very thorough horizon scanning.

Written by Huw Williams, SAMI Principal, [published 18 July 2018](#).



What's Hot in Technology: 2018 October update



Following our predictions for hot technologies in 2018, we provide a snapshot on the state of those predictions, an update of key developments in these areas and a rough assessment of our predictions. Those that have come true in some way are marked 'realised' while those that have yet to emerge are marked 'not yet in view'. Those that will appear through evolution rather than a single point event are marked 'ongoing', while our picks that have been bolstered in some way by subsequent developments are marked as 'emerging'.

Hashgraph

*Blockchain will undoubtedly create waves in 2018 and beyond, from the Bitcoin express through to practical uses in smart contracts and across countless industries. This is not to suggest that this new technology will not in time be supplanted itself by competitors offering improved features. **Hashgraph, for example, claims to work at 50,000 the speed of blockchain, whilst proving mathematically fairer and using less energy.** 2018 will see an explosion in rival technologies underpinning new cryptocurrency and ledger systems.*

Where are we now: We posited that 2018 would see the emergence of rival ledger systems to blockchain, with hashgraph first and foremost amongst them. In August 2018, Hedera Hashgraph raised \$100 million via a future token sale from institutional investors for its new commerce network based on its "hashgraph consensus" technology. The company suggests **its ledger technology can function much faster, more securely, and at a larger scale than current blockchain technologies.**

Status: Emerging

Shoppable social

*The lines between retail, social network and entertainment will blur to an even greater extent in 2018 than we have seen thus far. **Amazon has already launched a shoppable social network called Spark** whilst **Buy+, a Chinese virtual reality shopping experience backed by Alibaba,** engaged over 8 million users within a*



*week of launching.’ Social video, and other virtual interfaces, could represent the future of retail since 2019 is expected to see **video comprising 85 percent of net traffic and 50 percent of commerce arriving via mobile.***

Where are we now: Our entry suggested that ‘...social video, and other virtual interfaces, could represent the future of retail.’ In March 2018, it was announced that Instagram was to **expand its shopping features, allowing merchants to add shopping tags to their social media posts.** This year it has also been reported that ‘...social shopping is being adopted by social media and customers alike, but only 26% of **retailers have a formal plan in place for the digital transformation.**’

Status: Realised

Data becomes toxic

*Data competency has already ordained winners and losers and in 2018, it will continue to do so, albeit from new perspectives. Data volume will overwhelm all but the most prepared since average human knowledge is doubling every 13 months – **meaning, within a couple of years, the total information volume may double every 11 hours.** Allied to volume is a common vulnerability in many data models. Many lack explicit consumer consent – especially via apps, and few have equivalent to ‘key facts’ in financial services. As consumers realise the value inherent in their data, the unspoken legal risk in data models will upend all but the most prepared. What data we hold and how we use it will be the life and death of our companies.*

Where are we now: We suggested that ‘...the unspoken legal risk in data models will upend all but the most prepared. What data we hold and how we use it will be the life and death of our companies.’ GDPR in the European Union recognises this and has impacted on permissiveness in the use of personal data. While this dynamic still holds, we have already seen data issues impacting companies in 2018. Chief among them is **Facebook, which lost \$35 billion in market value following reports that Cambridge Analytica had unauthorized access to 50 million Facebook user accounts.**

Status: Realised / Ongoing

Employees+

*Perhaps with an eye towards automation or else simply improving their marketplace standing, **70 percent of employees say they would consider mind and body-boosting treatments if it improved their job prospects.** Although futuristic sounding, smart drugs such as modafinil are already reportedly widespread in academia, industry and beyond. HR policies may need revisiting to place guidelines for brainhacking and other routes employees will be seeking to gain an edge.*

Where are we now: Plenty of articles have focussed on the augmentation of human work with A.I., but little new evidence further supports our reported assertion that ‘...**70 percent of employees say they would consider mind and body-boosting treatments if it improved their job prospects.**’

Status: Not yet in view

Self-inflating structures

With housing shortages contributing to acute market misalignments in some advanced economies, and the need for ‘insta-infrastructure,’ following catastrophes around the world, a new built form paradigm is required. Furthermore, companies will increasingly



value flexible solutions to their office space issues. 3D printing already provides a platform for addressing these issues. In 2018, more tech-based solutions will appear to compliment it, such as MIT's self-inflating structures project that works as a **'...functional tool for things such as distributed assembly processes, transportation of goods, emergency response and architecture.'** Flexibility in the built form could radically redraw the economy; in 2018, we expect proto examples of this change of direction to hit the headlines.

Where are we now: Possible developments in 4D printing promise an era of programmable buildings, perhaps including 'self-inflation' or self-building. Furthermore, in May 2018, a team of Polish designers won a competition with its design for an inflatable skyscraper designed for use in emergency zones. 'The building is called "Skyshelter.zip" and it's envisioned as a structure that can provide shelter for refugees from natural disasters such as hurricanes, tornadoes, and earthquakes. Skyshelter.zip is a tower that can be as tall as 328 feet high, so it could provide room for up to 1,000 people on multiple floors. **It could also serve as a first-aid dispensary, or even be configured as a vertical farm to produce badly needed food in a disaster area.**

Status: Emerging

Interaction 4.0

The way we will buy, build and use technology is changing rapidly, which means the teams and ecosystems that build it and run it will need to change too. Designers should be especially cognizant of this. In 2016 mobile net use overtook computer net use, whilst by 2020, **'...50 percent of all searches could be voice searches, and around 30 percent will involve no screen whatsoever.'** VR, holograms, AR and haptics will all feature; 2018 will see the omnichannel become a lot more crowded.

Where are we now: Interaction 4.0 is well underway, perhaps to the point of this being too mainstream to be an individually identifiable trend. Accenture (Feb 2018) reported that 80 percent of executives believe it will be important to leverage **extended reality solutions to close the gap of physical distance when engaging with employees and customers.**

Status: Realised

7. New consumer industries (from colliding technologies/industries)

Consumers **'...demand experiences, not just products, and have become active participants at every stage of the value chain'**. In many cases this erodes industry boundaries and creates new markets at the intersections of collision, such as wellcare where health, wellness and beauty collide. There is no one single technology that is driving this Hot trend; rather the realisation that B2B2C markets are reconfiguring into delivering desired consumer outcomes. How to organise for this – in terms of aligning organisation structure to technology provision – will be key.

Where are we now: Given the blurring nature of many new industries, it often requires a little distance before we can say 'this is new,' as opposed to company xyz is doing something different(ly). What we currently perceive as new revenue streams, or mashups may in time become their own distinct industry, or more likely, ecosystem.

Status: Ongoing

Photonics



As an intermediate step on the path to quantum computing, photonic computing could provide the ‘...**same accuracy as the best conventional chips while slashing the energy consumption by orders of magnitude and offering 100 times the speed.** By 2020, **larger systems capable of achieving multiple Exaflops are forecast to arrive.** That would enable even handheld devices to have AI capabilities built into them without outsourcing the heavy lifting to large servers, something that would otherwise be next to impossible.’ All data could therefore be processed in near real-time, at the edge of networks such as the IoT. IT strategies, consumer behaviour and the architecture within which to operate would all shift as a result, some in unpredictable ways.

Where are we now: Despite a host of research **milestones**, and some **setbacks** in 2018, the promise and premise of photonics remains one for the near future. One researcher in 2018 suggests that ‘...if you look at **photonic integrated circuits today, the complexity is comparable to the complexity the microelectronics industry** was integrating into their circuits in the mid-1970s.’

Status: Ongoing but tipping point not yet realised.

Personalised analytics

With McKinsey estimating around a third of the current CEO remit is already outsourceable, and examples of mass automation of management roles already appearing with hedgefunds and beyond, 2018 will see a clamour from professionals seeking to future-proof their roles. Ironically, AI may provide an answer. ‘**Personalized analytics (will) become mirrors and lenses for refocusing professional effectiveness**, says MIT research fellow, Michael Schrage MIT research fellow. ‘Michael envisions selvesware serving the role of **a perpetually present leadership coach providing real-time advice on executive behaviour.**’

Where are we now: In many ways we are already surrounded by personalised analytics, but even within the narrower work-based confines in which we identified it, examples are emerging. In October 2018, it was reported that Chinese giant Baidu is **reportedly testing neural networks that can match job seekers to jobs**. Further evolution of the system could morph into one where people can self-analyse skills, have remedial courses or books recommended to them or have ideas vetted by AI.

Status: Ongoing

Machines have their own bank accounts

There can be little doubt that widespread automation brings about a raft of societal and ethical questions. Hitherto fringe ideas will gain currency as the automated economy takes hold. The rights of robots to the fruits of their own production may become one such issue in the near future. The Commonwealth Bank of Australia is reportedly looking into the implications of a future in which ‘...**machines have their own bank accounts and pay for replacement parts and engineers to service them,**’ whilst the European Union has already called for ‘**the consideration of a Civil Law Rule of Robots**’. Intellectual property rights could flow from this, suggesting machines could become their own economic agents in the near future to a degree currently considered unthinkable.

Where are we now: As far as our prediction went, this was perhaps the most outlandish, despite citing sources of some banks already considering the implications of this. To our knowledge, no machine has yet started accumulating personal wealth. However, in the U.S, ‘...legal scholar Shawn Bayer has shown that anyone can confer



legal personhood on a computer system, by putting it in control of a limited liability corporation in the U.S. If that manoeuvre is upheld in courts, **artificial intelligence systems would be able to own property, sue, hire lawyers and enjoy freedom of speech and other protections under the law.** Perhaps the bank account is not too far away after all?

Status: Not yet in view.

The next blog will look at new emerging trends seen during the year so come back soon.

Written by David Smith, Chief Executive, Global Futures and Foresight, [published 24 October 2018](#).



New Technology trends emerging in 2018



Following last week's post which updated the trends discussed in our blog at the beginning of 2018, here are another five trends that have emerged during the year and are showing immense growth in potential.

New entries

3D variety

3D printing has been around for decades, albeit mostly on the manufacturing fringes and for prototypes. In the last decade, it has assumed prominence but remained generally confined to plastics. Material options are widening however, as cost and time are mutually reduced. Such developments could optimize traditional material properties. With it, our very ways of mass-producing products could be about to change profoundly. For example, researchers from the Lawrence Livermore National Laboratory have developed a **3D printing method for creating stainless-steel parts twice as strong as traditionally made ones**. In addition, the world's first bio-inspired 3D printed cement paste has been produced, which **refills when cracked and thus promises to make infrastructure more resilient to natural disasters and ageing**.

The walls have eyes: facial recognition.

Facial recognition technology is finally ready for its post-phone future. Questions remains as to whether as a society we are ready for its implications even as businesses roll out its use. Delta Air Lines is launching what it calls the first **"biometric terminal" in the US, using facial recognition at check-in, security and boarding**. Doha's Hamad Airport wants to use the technology – seen in Dubai's virtual tunnel-shaped aquarium- to eliminate the need for passports within 5 years. Since 70.4 percent of passengers want **tech to help speed things up at the airport**, and with 77 percent of airports and 71 percent of **airlines considering biometrics options**, we would expect airports to become the first widespread case use for the technology. Its wider use in society will almost certainly be more contested, however.



Cognitive commerce

Artificial intelligence is hardly a new phenomenon – it could have featured as a top technology for every one of at least the last twenty years – but as capabilities increase, so do its implications. Some 47 percent of smartphone shoppers would like a service that automatically restocks everyday items, 63 percent of whom think **most people will have a personal shopping advisor within three years**. Meanwhile nearly one in three consumers globally say they plan on buying an **AI device or personal assistant, but this is close to 50 percent in East Asian countries**. It is only a matter of time – perhaps less than a year – before these personal devices mesh with in some with either Google’s predictive tech or Amazon’s recommendation engines. When it does, we will be on the frontlines, perhaps prosaically at first, of automated cognitive consumption.

Mini me digital twin

Cognitive commerce may require a digital go-between along the lines of a digital avatar or virtual assistant, to represent us, prompt us or point us towards recommendations. **Gartner sees mainstream adoption as early as 2020, along with speech recognition**. We would therefore expect prototypes chiefly representing ordinary consumers, as opposed to brands, to appear in the interim. Some 48 percent like the idea of a digital alter ego; in-fact **46 percent say it would help improve the quality of their life**. With digital identity also set to become a key industry and technology in its own right, the idea of our own personal digital twin – a trusted (by ourselves and those we interact with) verified, online presence could quickly become a key staple of digital life.

The IoE

With **4,756 IoT connections now being made every minute**, perhaps it is no longer enough for every company to be a tech company or even a digital company. The Internet of Everything is set to boom thanks to ‘...sticker-like electronics or sensors,’ that can be attached to the outer surface of any given object. This could add an **Internet connection to almost any product, even without manufacturing changes**. Thanks to synergies with other technologies, such as blockchain, around one-third of potential deployments are applicable across multiple industries. This brings a **new disruptive wrinkle to the technology** and could move it out of the hype and experimentation phase into a new way of doing things.

Written by David Smith, Chief Executive, Global Futures and Foresight, [published 31 October 2018](#).