20 March 2017 – 6:30pm GMT
House of Commons, Committee Room 15

**BIG
INNOVATION
CENTRE**

What is AI?

A theme report based on the 1st meeting of the **All-Party Parliamentary Group on Artificial Intelligence [APPG AI].**

What is AI? is a theme report based on the first meeting of the **All-Party Parliamentary Group on Artificial Intelligence (APPG AI) -** held on 20 March 2017 at the House of Commons.

This meeting was chaired by Stephen Metcalfe MP.

The evidence presented in the report is not exhaustive but reflects what was discussed at the meeting, and the views and experiences put forward by the people giving evidence. Written submissions by individual expert advisors in relation to this meeting are also included.

The APPG AI was established in January 2017 and its officers include:

- **Stephen Metcalfe MP**- Co-Chair
- **Lord Tim Clement-Jones-** Co-Chair
- Chris Green MP- Secretary
- The Rt Rev Dr Steven Croft-Bishop of Oxford- Treasurer
- Baroness Susan Kramer- Vice Chair
- Lord Robin Janvrin- Vice Chair
- Lord Alec Broers- Vice Chair
- Mark Hendrick MP- Vice Chair
- Carol Monaghan MP- Vice Chair

What is AI?

A theme report based on the first **All-Party Parliamentary Group on Artificial Intelligence [APPG AI]** Evidence Giving meeting**.**

20 March 2017 – House of Commons, Committee Room 15

ARTIFICIAL INTELLIGENCE

Overview

Artificial Intelligence [AI] appears to be the buzzword of the year. We have all heard it before (perhaps some of us have even used it), but very few know what it actually means.

The All-Party Parliamentary Group on Artificial Intelligence [APPG AI] was created with the purpose**: to unpack the term, to gather evidence to better understand it, to assess its impact, and, ultimately, to empower decision-makers to make policies in the sphere.** Government, business leaders, academic thought leaders and AI entrepreneurs came together in an effort to share evidence and beliefs, and assist in setting an agenda for how the UK should address AI moving forward.

Evidence Gatherings	More-Informed Stakeholders	Higher Public Awareness and Engagement	Fact-Based Recommend-ations and Frameworks	Effective Policies and Regulation	Increased Social Value

The first Evidence Giving meeting was held at 6:30pm on 20 March 2017, at Committee Room 15 in the House of Commons.

> **The aim of the first APPG AI meeting was to discuss the different meanings that Artificial Intelligence can have depending on its use, application and sector. We discussed the different forms of AI.**

A group of 113 stakeholders - including some of the APPG AI officers, the APPG AI Secretariat (Big Innovation Centre), parliamentarians, and expert advisors (from research institutes, academia, small, medium, and large-sized companies and not-for-profit organizations) – came together to begin a thought-provoking engagement process aimed to unravel the different aspects of AI.

The meeting was led by co-chair Stephen Metcalfe MP and five experts in the AI sphere: Michael Wooldridge (Head of Computing at the University of Oxford), Jon Andrews (UK Executive Board Partner and Head of Technology and Investment at PwC), Alex Housley

(Founder and CEO at Seldon), David Ferguson (Head of Digital Innovation at EDF Energy), and Ankur Modi (CEO at Status Today).

---

113 TOTAL PARTICIPANTS

---

5 Pieces of Oral Evidence

---

10 Pieces of Written Evidence

Four key themes can be extracted from the discussion and are further explored in this report:

Theme	Description
1. AI is Multi-Faceted	The reality is that AI has multiple meanings- depending on the specific context. There are two types of AI, **strong and weak**, examples of which can be seen in various sectors, including consultancy and legal, finance and insurance, health, energy, fast-moving consumer goods, high valued manufacturing, military, research and education, transport, IT, software, and media and communications.
2. AI is Opportunity	AI has already had positive impact in society; and, has the potential of opening doors to **economic, social, and environmental** opportunity in the upcoming years.
3. AI is Transformative	AI has transformed, and will continue to transform, what we know as the status quo. **The job market will be altered, the concept of privacy reframed, and industry structures redesigned.**
4. AI is the Road Ahead	The UK can be one of the leaders in the AI movement; however, critical steps have to be made to seize the opportunity: ▪ **Need to build public engagement and trust** ▪ **Need to sustain and foster an AI-friendly environment** ▪ **Need to capitalize on AI initiatives**

This theme report is not research-oriented but aims to summarize these four key themes,

using the evidence gathered at the first APPG AI evidence meeting (details above). It is not exhaustive but reflects what was discussed at the meeting, as well as the views and experiences put forward by the people giving evidence. Written excerpts by individual expert advisors in relation to the meeting are also included.

The fourth section concludes with a table illustrating the main recommendations looking forward.

Event Summary

Co-chair Stephen Metcalfe MP kicked off the first Evidence Giving meeting for the APPG on Artificial Intelligence [APPG AI]. Welcoming the speakers and the entire audience, he noted that the mission of the day was to unpack AI and its different meanings, as well as share evidence with various stakeholders (academia, the government, corporate companies, start-ups, etc.).

Michael Woolridge started the discussion distinguishing between strong AI and weak AI. While strong AI aims to develop a machine's intellectual capability functionally equal to a human being, weak AI is much simpler, focusing on the automation of a specific task. Most successful cases of AI – such as face recognition or lip reading – are examples of weak AI. He noted that AI is already impacting society in various ways and creating new economic and social opportunities. Nonetheless, he recognized that there are challenges coming along with AI, including unemployment issues, lack of privacy, autonomous weaponry, and algorithmic bias.

PwC's Head of Technology and Investment, Jon Andrews, continued, highlighting 5 areas society needs to focus on regarding AI. First, he discussed the need to demystify AI and make it clear not only for the general public but also for experts in the field. Second, he acknowledged that UK needs to develop learning processes so society can accept AI. Third, he commented on the gap between males and females in the sphere and called to seek ways to shrink this gap. Fourth, he raised the concern that society needs to learn to trust AI. Lastly, he also touched on the employment issue, agreeing that AI will cause a disruption in the job market.

Alex Housley, Founder and CEO of start-up Seldon, began his talk referring to AI as the "driver of the 4th Industrial Revolution." Providing examples of success stories such as DeepMind, he argued that machine learning has helped solve problems and, hence, made lives easier and faster. He explained to the group that there are clear social impacts (agricultural developments, poverty deduction, etc.) linked directly to AI. Like the others, he mentioned that there will be job losses but argued that AI will also create new jobs. He asked for the government to continue to foster an ecosystem in which AI can develop and, also, revolutionize the visa system to attract global talent from abroad.

The fourth speaker was David Ferguson, Head of Digital Innovation at EDF Energy. He illustrated how AI is being investigated by EDF Energy. For electricity generation, he used the buzzwords "safety" and "efficiency" to explain how AI has the potential to transform predictive maintenance and condition monitoring. For the customer angle, he discussed values like transparency, insight, and automation, and demonstrated how AI can deliver these for customers through "show me, help me, do it for me" mechanisms.

Lastly, Ankur Modi, CEO from Status Today, took the floor, stating that AI is "the most misunderstood term since the Internet." He explained that it is imperative to first understand human behaviour before truly understanding data. Furthermore, he discussed that awareness has to be built because there is a lot of misinformation instilling a sense of fear amongst society. He asked government to work with the private sector to establish a society that has an innovation-first mind-set that still respects privacy.

The meeting instilled a positive view of what AI means for the UK, and the global, future. As long as important issues related to employment, inequality, and privacy are addressed, the APPG AI concluded that the opportunities linked with AI far outweigh the risks.

Table of Contents

1. AI is Multi-faceted

Artificial intelligence is an "umbrella" term that can be broken down into several smaller parts, some of which include **machine learning, decision-making, natural language understanding, automated reasoning, autonomous systems, multi-agent systems, and sematic web.** It can be found all around us, in almost every type of sector: consultancy and legal, finance and insurance, health, energy, fast-moving consumer goods, high valued manufacturing, military, research and education, transport, IT, software, and media and communications.

In an effort to better understand the term, the speakers at the first APPG AI Parliamentary meeting unfolded its various components and shared trends in the respective fields. According to the Founder and CEO at Seldon, Alex Housley, the international arena is currently experiencing the greatest movement in terms of machine learning, a type of AI in which a machine approaches a problem not by being explicitly programmed but by learning from algorithms. Machine learning tackles a task at a superhuman level, making data-driven decisions and predictions. Big data, computer power, and scientific resources are the three ingredients that have given rise to this era of machine learning advances.

Excerpt 1: Professor Michael Wooldridge

Michael Wooldridge
Professor and Head of Department of Computer Science at University of Oxford. Thought leader in multi-agent systems, having published over 300 articles in the area.

AI has enjoyed wildly varying fortunes since it was first mooted in the late 1950s. Initial promise with making systems that could learn, plan, and solve problems did not live up to expectations, leading to a backlash -- and this boom and bust cycle has been repeated several times since then, as successive new ideas that promise to take us to the goal of AI have made progress only in narrow areas.

The AI technology of today that is attracting international attention is machine learning. This is an old research area, but the last 15 years have seen genuinely impressive breakthroughs, driven in part by scientific advances, but perhaps just as much by the availability of big data and cheap computer power, which are used to "train" machine learning systems. Machine learning systems are behind automated translation systems that would have been regarded as science fiction just 20 years ago; they are behind the face recognition software that is now ubiquitous on social media; and they are

behind the imminent driverless car revolution. Machine learning techniques, though, provide no route to the grander dreams of AI: they work best on narrow, well-defined tasks, where there is lots of data valuable to learn from, and clearly defined criteria for success and failure. I see no "singularity" (where machines achieve human-level intelligence) in the immediate future. The UK has internationally leading activity in Machine Learning - DeepMind is the world leader, and several UK universities have world-class groups. The main opportunity for the UK is in leveraging this advantage, particularly in the start-up sector. The main risks of AI that I see relate to unemployment and inequality as the long process to automate human work enters a new phase, and risks to privacy in the age of ubiquitous AI.

There are several pioneering initiatives underway in the UK, and abroad, in machine learning and in the broader AI umbrella. However, as noted, although most people are familiar with the term, few understand it. Most, when asked what AI is, immediately think of the Hollywood version in which robots take over the globe. *Hence, due to this lack of understanding, people tend to fear AI, worried about possible negative consequences and unaware of the positive economic, social, and environmental impact.*

As Ankur Modi, CEO at Status, pointed out during the session: "**AI is arguably the most misunderstood term since the Internet.**" The wider public, but also experts in the field, are incapable of truly defining it and understanding its multiple parts and facets.

APPG AI has taken it as one of its missions to educate the key stakeholders (the government, academia, industry leaders and society) as well as the greater public on what AI is, what AI can do, and what AI cannot do.

Excerpt 2: Professor Margaret A. Boden

Margaret A. Boden
British Professor of cognitive science in the fields of artificial intelligence, psychology, philosophy, and computer science. Author of several AI books, including her recent piece: *AI, Is Nature and Future*.

AI is the attempt to enable computers to do the sorts of things that human and animal minds can do (although not necessarily in the same sorts of ways). As such, it runs from planning and machine learning, through computer vision and natural language processing, to robotics and artificial life.

It has already produced an enormous number of useful applications, which surround us almost everywhere—many of which are largely invisible. They are used—indeed, depended on—by individual people, commercial organizations, and government departments making policies in many different

areas. The advent of the Internet of Things, which will produce staggeringly large amounts of interconnected data, will increase our AI-dependence still further. In brief, our world would collapse without it.

AI has two main motivations: scientific and technological. Most AI workers are inspired by only one of these (the technological), but some are inspired by both.

"Scientific" questions are sometimes addressed for primarily technological reasons: if we can find out how the mind/brain does a certain task, we can try to copy it in AI and then use it or sell it. Sometimes, however, the science is addressed for its own sake.

My interest in AI is primarily for its scientific implications. It has given us a host of concepts, and a variety of modelling techniques, that can throw light on fundamental problems in psychology, neuroscience, and theoretical biology.

They throw light also on the philosophy of mind and life. It's my view that one can't understand what the mind is, or how it relates to the brain, without a good knowledge of AI. In brief, the mind is the virtual machine (or rather, the integrated set of very different virtual machines) that is implemented in the brain. As for life, the core feature of living things is the capacity for self-organization--whether at the level of individual cells, developing embryos, adult metabolism, or the evolution of species. The notion of self-organization appeared problematic, even paradoxical, for many years. Today, however, work in AI has helped us to understand both what it is and how it is possible.

In those respects, the future of AI is immensely exciting. It will teach us a lot. AI's future is also exciting, of course, at the practical, everyday, level. It has already changed our world, and will surely continue to do so. I don't believe that human-level general intelligence (still less, super-human intelligence) will be achieved by AI within this century. But many advances will be made, nonetheless.

Ideally, AI will help us to value the specifically human aspects of life: empathy, love, fellow-feeling, and a shared appreciation of the human condition.

(These ideas are explored in my recent book: AI, Its Nature and Future, published by Oxford University Press in 2016.)

AI is Divided into: Strong and Weak AI

Although AI is made up of several various parts, the evidence givers at the meeting distinguished amongst two specific types. Specifically, they clarified that when people refer to various AI examples, they tend to categorize them into two main groups: Strong AI, otherwise known as the Hollywood version, and Weak AI.

The goal of Strong AI is to develop technology to the point where a machine's intellectual capability is functionally equal to that of an individual's. According to experts, the ideal Strong AI machine, would be built in the form of a human, have the same sensory perception as a human, and go through the same education and learning processes as a human child. Most of the AI illustrated in Hollywood science-fiction – whether it is network Skynet threatening the

human race in the film *Terminator* or David, the robot in Steven Spielberg's 2001 film *A.I. Artificial Intelligence* – fit the categorization of Strong AI.

Yet, as argued by Professor Michael Wooldridge, the majority of AI technologies that have been developed thus far, do not match this Hollywood perception. In fact, the most successful AI applications like face recognition, lip reading, spoken language interpreting, and real-time translation are all examples of Weak AI. In the Weak AI category, computers focus on automating a very specific, or narrow, task. The aim of these technologies is to develop the capability to successfully complete a given task, in the most efficient way possible. The machine does not adapt all human qualities but, rather, uses human-like traits to solve a problem.

A popular example of AI that most people know is Apple's Siri. Siri, at first sight, appears to have a brain of her own but the machine actually operates in a very predefined and narrow manner. In other words, if you ask her something she is not programmed to respond to, she is unable to answer or, sometimes, gives inaccurate results.

Given that the large majority of today's AI applications fit the narrow category, the APPG AI participants agreed to focus their scope on the opportunities and likely future impacts belonging to this grouping.

Excerpt 3: Rodolfo Rosini

Rodolfo Rosini
CEO at Weave.AI, a company aiming to transform the mobile experience using AI, contextual search and deeplearning, learning from users as it goes and offering them information and services from the other apps on the phone.

I would encourage the APPG to ignore the differences between generic AI (GOFAI, or "strong AI") and specialized AI (good to solve one specific problem). The history of computing already shows us that over time we are going to build new systems that are going to be more flexible and require less human supervision and training until we are going to have AIs that can solve any task. So we need to think not in terms of the limitation of technology of today but instead about what is going to happen in the near future as all the different AI disciplines will inevitably start to converge.

My job as an entrepreneur is to anticipate market demand (or to create new markets altogether) as a result of the availability of new technology. I believe that AI as the most fundamental technology of the next few years.

The United Kingdom has a distinguished history in basic science and being the source of new

technological breakthroughs. It also has a sad track record of failing to exploit the scaling and commercialization of every single new technological platform: like the car, TV, the web and mobile to name a few. You have to go back to the radio to find one tech platform that flourished domestically and that spawned multiple entities (the BBC being one of many). This is stark contrast with other industries like telco, banking or energy where the UK has been able to give birth to several global market leaders in their respective sectors. Since the advent of the Internet the UK has been unable to produce a single large technology company while the US and China are the new kingmakers. The difference this time is that a super intelligent AI is possibly one of the last technologies mankind will have to invent.

It is crucial, in my opinion, that we should undertake a national strategy to make sure that such technology is created within our borders, under our control, and for our benefit. I am not talking about government investing in new businesses, instead the government should create the right conditions from the point of view of the law, defense, tax, healthcare so that increases R&D efforts and the chances of success for companies in those sectors.

It is not yet obvious now, but it will be in a few years, that the AI APPG is going to be one the most important APPGs in Westminster and its influence will grow immensely and spawn satellite groups.

2. AI is Opportunity

While unpacking AI, the thought leaders at the first APPG AI evidence giving meeting argued that AI has already been embedded within society and has resulted in not only economic positive impact but also social and environmental. Furthermore, they acknowledged that AI can open doors to new opportunities to solve problems and make the world a better place.

AI is a Source of Economic Growth

Artificial intelligence is developed to address existing and new problems in an efficient and effective way. In consequence, AI technologies will lead to increased profitability and other economic benefits on an individual, corporate, national, and global level.

Global studies predict that the AI market will significantly increase in the next decade and economic benefits related to AI will be visible across sectors. Market research firm Tractica forecasts **AI revenue will grow worldwide a 57-fold increase from 2016 to 2026, from 643.7 million dollars in 2016 to 36.8 billion dollars by 2025.**

Figure 1: Artificial Intelligence Revenue, World Markets: 2016-2026
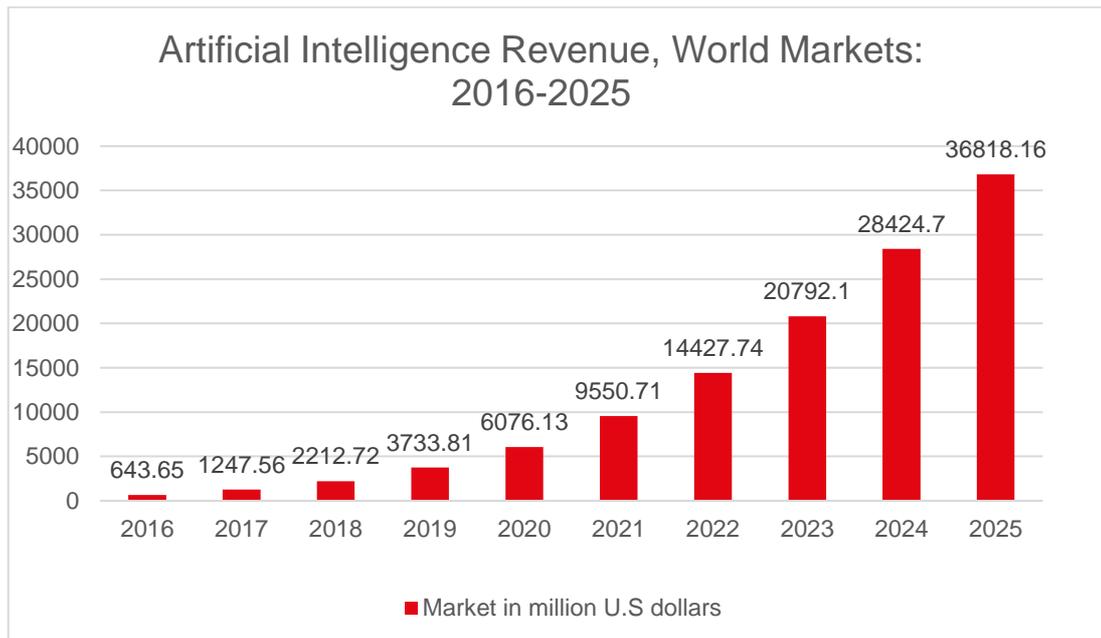
Source: Tractica's "Artificial Intelligence Market Forecasts" Report, 2016

The Tractica report provides a quantitative assessment of the market opportunity for artificial intelligence across the consumer, enterprise, and government sectors. The report includes market sizing, segmentation, and forecasts for 191 specific AI use cases and the 27 industries

in which they will play a role.

Infosy's *"Amplifying Human Potential: Towards Purposeful Artificial Intelligence"* mirrors these findings. The report surveyed 1,600 IT and business decision-makers in organizations of more than 1,000 employees, with $500 million or more annual revenue and from a range of sectors, in the following countries: US, UK, France, Germany, Australia, China, and India.

The data revealed:

- **76% of respondents cited AI as fundamental to the success of their organizations' strategy.**
- **By 2020**, those currently or planning to use AI technology anticipate a **39% boost to their organizations' revenue**, on average.

When a person in the audience asked the evidence givers what industry they would invest 1 billion pounds in for AI, *the speakers agreed that - as far as economic impact is in scrutiny - the best industry to invest in is finance;* but nonetheless, they anticipate positive economic impact across all sectors.

David Ferguson, Head of Digital Innovation at EDF Energy, explained to the group how traditional companies, such as EDF Energy, are already developing and implementing AI approaches – especially in their R&D departments – in order to increase profits and adequately compete in the international arena. At EDF Energy, AI initiatives aim to assist in electrical generation and to increase customer satisfaction.

Excerpt 4: David Ferguson

David Ferguson
Head of Digital Innovation at EDF Energy - with particular expertise in digital innovation, corporate sustainability, strategy and strategic change.

A lot has been written about Artificial Intelligence (AI), often in slightly polarised terms: either it's going to end humanity or it is going to solve every last one of our problems.

For the time being, reality is a little more mundane.

My job is to help EDF Energy explore cutting edge digital technologies and to test them in the real-world. The scope of our work on AI, most of which remains at the R&D stage, reflects the scope of our business:

-For electricity generation, AI can bring greater safety and efficiency
-For our customers, AI could provide greater transparency, insight and automation

Electricity generation

Predictive maintenance - Predicting equipment failure in power stations or wind farms would allow us to organise maintenance tasks more efficiently. In a worst-case scenario it could prevent unplanned outages of power stations, but at the very least it would allow us to group maintenance tasks more efficiently. Remember: 1 day of outage at a nuclear power station costs around £1m and getting someone on to an offshore wind turbine costs around £20k. We have done a little work in this area but it remains a largely untested opportunity.

Real time operational support - AI has the potential to make sense of highly complex systems to support real-time decision-making. We've tested a few approaches that connect seemingly unrelated systems to understand their inter-relations. In the medium term information could be presented to power station operators for them to act upon, or not. In the longer term they could be integrated into command and control systems. The natural end-point in this line of thought is: if you can have a driverless car why not a driverless nuclear power station? Naturally there would need to be strong engagement with the regulator to ensure safety and confidence.

Customers

We recognise that energy use is not a topic that excites many people, even those who would benefit greatly from saving energy. Our approach to get around this comprises three steps and we see an important role for AI:

Step1: Show me
- We have applied machine learning to understand heating patterns of our customers. We are testing algorithms that can disaggregate the smart meter signal. We have developed Natural Language Understanding services to present energy tariff information in a more human way - either with bots or with Amazon Echo.

Step 2: Help me
- We are developing algorithms to help customers set their heating schedule according to a financial budget.

Step 3: Do it for me
- We are looking at how to automate the home: (1) On the energy side, to optimise consumption of energy, (2) For connected devices in the home.

Considerations

Obviously for an operator of nuclear power plants, security and safety must be our number one consideration. This is also important in the field of the Connected Home, where homes could be managed remotely by an AI. Transparency is crucial - just spitting an answer out of an AI black box will not be enough.

Many people have talked about the impact of AI on jobs. For some parts of our business, AI will most

likely be an enhancement - a virtual, highly skilled assistant. For others – customer service, legal - it could mean fewer jobs. This raises many challenges for HR strategy.

Finally, it's likely that AI will accelerate new business models, particularly the transition from selling a product/commodity to service driven models. We need to ready the business for this disruption.

Large companies, like EDF Energy, and smaller growth companies, like Seldon and Status Today, are already embarking on the path of artificial intelligence- using existing AI-based technologies in their daily processes and, also, developing new AI-based technologies.

AI is Impacting Social and Environmental Wellbeing

More than just economic efficiencies, however, artificial intelligence can lead to significant social benefits as well. Most of the benefits are already affecting various spheres including health, transportation, education, and public safety.

Alex Housley pointed out a few of the ways AI has already shown positive impact for society. He said: **"machine learning can also help us tackle some of the world's biggest problems:**

- **Drug discovery and image diagnostics in healthcare,**
- **predicting crop yields in agriculture,**
- **and increasing power efficiency – from data centres to the national grid and soon smart grids."**

To the question asking which sector each speaker would give 1 billion pounds in for AI, *the speakers agreed that - in terms of social value - the **health** sector would be the most impactful.* Technological developments like monitoring devices can detect medical issues and prevent health problems. Healthcare robotics can make surgical procedures more efficient. Overall, AI technologies have the capability to improve the health of millions.

In terms of **transportation**, self-driving vehicles are already being in the process of being introduced to society by companies such as Google and Tesla. Autonomous transportation is expected to be the norm in the near future and, hence, transportation, will likely be the sector that will most impact how people perceive AI technologies.

AI technologies in the **education** sector can make the learning and development process for children and adults more personalized.

Lastly, AI has already shown tremendous success in the **security** segment. Precisely, machine learning has targeted cybersecurity and spam detection in order to improve the safety of the general public.

Excerpt 5: Dave Raggett

Dave Raggett
W3C Lead at The Internet of Things – focusing his work on a synthesis of Linked Data, AI and Cognitive Science for the Cognitive Web of Things.

Cyber security is a very real and present danger to our economy. Machine learning techniques can be used to track normal behaviour and flag up when something out of the normal is detected, and to trigger the appropriate counter measures. This relates to the concept of system resilience in the presence of faults, cyber-attacks and unexpected demands that have the potential to disrupt operations.

AI can be applied to security policy that defines how a system adapts to minimise the impact of an attack. This can include human-machine collaboration in conjunction with security experts. AI systems can be vigilant 100% of the time and infinitely patient compared to human surveillance.

AI can also be applied to techniques that make it more costly for attackers to impact a given system. One approach is to use federated architecture rather than a centralised architecture, as this requires an attacker to target many machines rather than just one, thereby increasing the number of compromised devices needed for massive denial of service attacks.

This matters for the services provided by companies as well as those provided by the state. I would therefore recommend that the role of AI for strengthening cybersecurity be highlighted.

In sum, AI has already positively affected society economically, socially, and environmentally across different industries and sectors; and, furthermore, it has the potential to create opportunities for much greater impact.

3. AI is Transformative

AI is said to be the number one transformative technology of the years to come. Society, however, often fears transformation, worried about the unknown associated with disruptive processes and technologies. The APPG AI recognized **we are living at a critical juncture in determining how to address these transformations - in order to ensure AI does not produce negative impacts for society**, threatening values and processes many human beings care dearly about.

AI is Changing Employment

The group acknowledged that, as a result of AI, job disruption in some industries is a reality. Professor Wooldridge cited that 3.5 million drivers in the U.S. will soon be out of employment and similar trends are expected in the UK as well. Decision-makers should assure they are prepared to deal with these projected job losses.

Certain industries such as customer service are at particular risk while others like engineering will experience minor changes. Individuals in the high risk industries should be trained to become adaptable to an AI-friendly world, so they can compete in the future job market. Others in low risk sectors should also be trained so they can effectively use AI-technologies to complement and assist them in their daily routines.

There will also be differences in impact within organizations. David Ferguson commented that some roles will be affected more than others. For some parts of business, he argued that AI will most likely lead to an enhancement as it will offer a virtual, highly skilled assistant. On the other hand, for others (i.e. customer service or legal departments) it could mean fewer jobs.

Jon Andrews, UK Executive Board Partner and Head of Technology and Investment at PwC, also recognized how AI will change employment norms. However, he noted that this is not a new phenomenon. Looking back in history, there have always been patterns in which transformations in supply and demand have caused some jobs to vanish and others to develop. Likewise, "**AI will result in some job losses but it will also create lots of new job opportunities,"** he explained.

Excerpt 6: Jon Andrews

Jon Andrews
Member of PwC UK's Executive Board with responsibility for Technology and Investments, interested in AI impact in society.

How do we plan for the workforce changes of the future?

- PwC has just published its UK Economic Outlook. The report assesses the potential impact of job automation on the UK and other major economies.

- Our analysis suggests that around 30% of existing UK jobs could be impacted by automation by the early 2030s, but this will be offset by job gains elsewhere in the economy. This is lower than the US (38%) or Germany (35%), but higher than Japan (21%). The risks appear highest in sectors such as transportation and storage (56%), manufacturing (46%) and wholesale and retail (44%), but lower in sectors like health and social work (17%).

- For individual workers, the key differentiation factor is education. For those with just GCSE-level education or lower, the estimated potential impact of automation could be as high as 46% in the UK, but this falls to only around 12% for those with undergraduate degrees or higher. However, in practice, not all of these jobs may actually be automated for a variety of economic, legal and regulatory reasons.

- Furthermore new automation technologies in areas like AI and robotics will both create some totally new jobs in the digital technology area and, through productivity gains, generate additional wealth and spending that will support additional jobs of existing kinds, primarily in services sectors that are less easy to automate.

- Just because it is technically feasible to replace a human worker with a robot, doesn't mean it's economically attractive to do so. Levels of automation will depend on the relative cost and productivity of robots compared to human workers in carrying out different types of tasks. We expect this balance to shift in favour of robots over time, but there should still be many areas where humans retain a comparative advantage.

- The net impact of automation on total employment is therefore unclear. Average pre-tax incomes should rise due to the productivity gains, but these benefits may not be evenly spread across income groups.

- It is therefore important that the government, industry and stakeholders work together to consider how the potential gains from automation can be shared more widely across society.

- Investment in lifelong learning and a positive attitude to embracing change needs to be a fundamental aspect of the UK's future success. Responsible employers also need to ensure they encourage flexibility and adaptability in their people so we are all ready for the change.

The professional services sector has a major part to play in working with other stakeholders to address these challenges and we look forward to contributing.

Ankur Modi, CEO at Status Today, highlighted that **the key mission in today's agenda is to: educate the next generation of jobs**. The potential job pool has to develop the skills and capabilities to meet the new job positions' requirements. The truth is that the amount of qualified individuals who can adequately design and manage these new AI-technologies are extremely limited.

Hence, if society is taught these new skills, unemployment related to AI will not be an issue. There will be a disruption in the job market, but individuals will be empowered to shift roles and/or industries.

Secondly, a second challenge that surfaced during the meeting, was the risk that AI will increase inequality gaps amongst various social groups - based on age, gender, race, and living wage. It is expected that AI will have the greatest positive impact for white, middle-aged males belonging to the upper class. The rest of the groups will not be as impacted by its benefits because, simply put, they won't have as much access to them.

There is already a huge gap of females and males in fields related to AI. Jon Andrews shared a recent survey conducted by PwC, showing that **only 27% of female students say they would consider a career in technology, compared to 61% of males, and only 3% of females say it is their first choice**. This is unsurprising, he added, when only 5% of leadership positions in the technology sector are held by women. It's clear that the lack of visible role models.

The issue of algorithmic bias is also closely related to the inequality problem. Algorithms might favour the more advantaged members of society and, hence, increase the gap between the rich and the poor. For instance, if an individual wishes to apply for a mortgage, the algorithm would base its results by making certain categorizations depending on an individual's age, race, social class, employment history, etc. As a result, an individual in the less advantaged groups of society might be rejected from a mortgage.

We need to create AI prediction tools that are transparent about decision-making processes, and their use of data and interferences. Furthermore, rather than using AI as a tool to reinforce human bias and stereotypes, AI technologies should be applied as mechanisms to identify and remove human bias.

It is vital that stakeholders recognize these employment and inequality threats, and pass regulation and build frameworks that help shrink the gap between the rich and the poor, the majority classes and the minority classes, men and women, and old and young. **The policies need to protect all individuals and assure the benefits of AI are spread fairly and broadly across society.**

AI is Reframing Privacy

Privacy was also highlighted as one of the biggest challenges AI has to face. There is a

common fear that AI - linked to an increased amount of data publically available – implies one's personal life will no longer be personal. Michael Wooldridge expressed that most of the individuals living in the UK value privacy greatly and are not easily willing to sacrifice it.

Ankur Modi commented that this is a mistaken belief - **privacy does not necessarily have to be undermined by AI**. Society should not be concerned about a lack of privacy in an AI-filled world.

Furthermore, AI can directly result in increased transparency. By understanding the underlying purpose behind the sharing of personal data, individuals can decide whether they would like to give their information in return for other benefits. For instance, in the healthcare sector, donating your personal data can help create medical treatments and save billions of lives in the long-run.

Currently, the lack of accepted mechanisms for privacy protection hamper the developments of AI technologies.

Excerpt 7: Ankur Modi

Ankur Modi
CEO at Status Today, an AI start-up that understands human behaviour in the workplace. The company's patent-pending AI delivers operational insights, helping organisations advance security, productivity and communication.

AI is commonly used as umbrella term to describe a set of technologies (e.g. text-to-speech, natural language processing and computer vision). It is the most commonly misused and misinterpreted term in today's world. Like the Internet was decades ago, AI is being thrown around without people truly understanding what it means.

Machine learning - also employed at StatusToday - is most prominent subset of AI. It deals with recognizing patterns in data and learning from them, similarly to humans but at a much greater scale and fraction of the necessary time. The more data the algorithms consume, the more accurate and effective they become at their given tasks.

Artificial intelligence has a lot to do with data. In order to understand data, one has to first understand human behaviour.

Most current AI developments across sectors are aimed at augmenting humans rather than making them redundant, with human-machine partnerships being at the center of business applications.

The UK has created an AI ecosystem and the government needs to ensure the environment is fostered and promoted. The main challenges we need to overcome as a society are: raising awareness about what AI is, protecting people's privacy, and addressing employment disruption.

Privacy is a value many individuals care about. People fear that AI technologies will undermine their privacy and that their personal information will be publically available to anyone. However, few know specifically what this information will be used for and how it will be impactful. While unpacking what AI is and what it is not, a key part is educating people on what transparency can bring about. As long as the decision-making processes wired within machines are clear, individuals can know how their information is being used. They can understand the direct and indirect benefits of these uses. Consequently, they will be empowered to choose whether they would like to share their information.

AI is Creating New Industry Structures

The last issue the APPG AI group raised highlights shifts in traditional industry structures. David Ferguson described how AI will lead to changes in business models. Precisely, he commented on how society will witness a **shift from a product-focused to a service-focused economy.** The relationship between the company and its clients is changing dramatically, becoming much more intimate and engaging - with more interaction made possible form various social media channels.

Also, there is a current trend of increasing mergers and acquisitions in the AI sphere. This trend spurs worry amongst society, causing one to wonder whether monopolization will be a serious threat in the near future.

Start-ups originate new ideas but often lack the resources and access to data needed to carry out these ideas. Big companies possess these resources and, most importantly, the capital needed to turn the ideas into reality. Therefore, it is more than common for large multi-national players, like Google, to buy smaller start-up companies, like DeepMind.

AI has not yet reached a monopolization point, but it is important for governments and international institutions to pass preventive regulation to make sure such a scenario will not happen in the future.

Representatives of small start-ups at the APPG AI meeting agreed on the importance of both public and private investments in order to compete in an increasingly demanding environment.

These shifts in industry structures have to be accompanied by strategic policies in order to ensure society is prepared to reap the full benefits.

4. AI is the Road Ahead

According to the thought leaders, the UK has the potential of becoming the epicentre of artificial intelligence. As highlighted throughout the report, however, there are critical steps the government and other stakeholders need to take foremost in order to ensure AI will cultivate in healthy conditions, ensuring protection of human values and wellbeing.

We have reached a critical point to respond to this fast-paced environment by encouraging public engagement, sustaining an AI-friendly environment, and capitalizing on AI developments.

Need to Build Public Engagement and Trust

One of the pivotal steps in ensuring a healthy AI- environment is raising awareness on what artificial intelligence is. **Misunderstandings about what AI is fuels opposition to technologies that have the potential of creating social value. Furthermore, misconception provokes unnecessary panic about what the future beholds.**

To avoid unneeded turmoil, there is a need to unpack the term AI for society. By encouraging open public engagement and debate, the element of uncertainty will eventually dissolve. Consequently, the public will be informed and empowered to raise concerns based on solid evidence and facts. Having a clear image of what AI can and cannot do, trust will also be created. As a result, the government will be able to move forward with regulation that ensures positive impact.

Excerpt 8: Charles Kerrigan

Charles Kerrigan
Partner and Head of International Finance Practice Group, Olswang - recognised as a leading contributor to the development of TMT Finance.

My points of interest are in the application of AI in financial services and the legal industry:

1.   Financial Services – Why and how should AI be regulated? Should any decisions or tasks be outside the scope of AI?

- We should be looking ahead towards framing the appropriate regulation which should operate in this area i.e. I would like the group to feed directly to government policy and legislative proposals.
- We should identify all stakeholders: likely to include developers of AI, knowing users of AI (e.g. corporate users), unknowing users of AI (e.g. consumers), policymakers, regulators etc.
- We should understand international views and policies – in my view much of our current difficulty with intangible assets in the business and finance worlds arises from inconsistent approaches to IP law in different countries.
- We should determine the interests of stakeholders so that we can judge how we are balancing them.
- We should agree at an early stage the outline principles we could use as a guide to legislative proposals – the Asilomar principles are a good start but too generic to form the basis of legislation.

I believe that the current principles-based approach in financial services is the right one and we should be setting a framework we could recommend.

- We should identify those areas where AI poses new challenges for legislation e.g. transparency in relation to operation and compliance
- We should consider whether AI can be used as part of the regulatory system in relation to policy, administration, enforcement or other (and where responsibility for this actions should lie)

2. Legal industry

- How will AI disrupt the legal industry in business terms?
- What concerns should regulators have in relation to these points?
- What guidance should we give regulators taking into account the points made at 1 above?

One point I haven't raised is how AI would work in other areas of law – there are clearly potential use cases (and existing uses in other countries) for AI in criminal justice and welfare but I'm not an expert in either so we may want to ask for evidence on these points at the relevant evidence session.

Jon Andrews rightfully points out the need to demystify AI and to: "**develop an appropriate language that is inclusive, accessible, and accurate, for all stakeholders from subject matter experts to the general public.**" Education has to be reformed in order to introduce artificial intelligence within child and adult curriculums.

The events of the APPG AI are a step in this direction, gathering individuals from various sectors and industries to share evidence and engage in discourse - to better understand the multiple aspects of AI.

Excerpt 9: Kevin Bailey

Kevin Bailey
Vice President – GTM Strategy at BAE Systems, responsible for proposing and overseeing its 5 year transformation strategy for Cyber Security and Financial Fraud & Compliance.

Artificial Intelligence (AI) will provide the ability to augment human resource interaction and decision making from citizen enrichment and capability to predictive warfare engagement, in many use cases eliminating the role of the individual or organisation.

AI is akin to the commercial and social ramifications of the democratisation of electricity. Electricity altered social engagement, redefined industry and work and bought the Industrial revolution into the home. If you were used to water (steam) power or relying on your learnt beliefs to determine your actions, acceptance of electricity aligns to the distrust and negative implications of AI in a world where even digital citizens are yet to understand its implications.

Technology has accelerated from being 'supply' bias to 'demand' need, as citizen's expectations increase the speed of innovation to meet their personal needs, affecting who/how they engage and the provision of a desired service. AI will become as critical in future technology as the processor chip. Machine learning, natural language processing, decision making are all just features that will be employed where necessary/or not; and over time replaced with new features that meet the need of different industry applications.

Like the industrial revolution, the citizen needs to be taught to embrace AI and integrate the advancements it will bring, whilst also keeping the relevant delivery and oversight organisations to account. Much of the operational activities of AI will involve data and decisions, which will need strong but appropriate standards/regulations to maintain a level playing field and not breach ethics and privacy.

The acceleration of technology has been overwhelming during the past 20 years, changing the landscape of the way people and businesses act efficiently, and its shows no ability to slow down as we embrace the Internet of Things (or Everything) and the 4th Industrial Revolution. What is also evident is the rise in 'new-age' criminality, otherwise known as 'Cyber Criminals'. The acceleration of technology has created gaps of exploitation for these criminals. AI needs to be developed with 'Security First' at the centre of its evolution, minimising the rise of negativity that will appear if an exploit damages the privacy, brand or actions of a citizen, business and/or government.

In essence Artificial Intelligence is coming, like it or not, it'll change what and how we do things, like it or not, everyone will be affected, like it or not. The best form of acceptance is awareness. AI will become outdated and replaced with a new technological evolution, but until then we should do everything possible to enrich not endanger our lives.

Need to Sustain and Foster an AI-friendly Environment

The five AI experts agreed that the UK is already ahead in creating an environment in which AI technologies can develop – alongside with other countries such as the US, Germany, and China. A combination of innovative policies, a cultivating environment, and a talented workforce have all contributed to making an AI ecosystem in the UK.

Lord Tim Clement-Jones asked: **what does it mean exactly to say UK is in the lead?** Michael Wooldridge replied that there are several companies, such as DeepMind, in the UK that are serving as pioneers and attracting top talent.

However, **it is important to sustain this environment and foster an even healthier one.**

First, as Michael Wooldridge pointed out, universities in the UK are doing a great job creating talent. However, we need to pass policies and build an environment that incentivizes this talent to stay inside the UK after graduating. The creation of a start-up hub with top-notch facilities is one way this can be done. Other potential solutions are to incentivize companies to invest in the UK, increase funds in academia, and encourage open innovation.

Second, the evidence givers agreed that the government needs to attract existing talent from abroad and also build more talent inside. Currently, the biggest players are competing over the smartest candidates in the field. There have been instances in which companies buy a start-up for the sole reason of acquiring the CEO or CTO to use his/her skills and knowledge for their future strategies. The UK should continue their efforts in producing this high-demand talent. They also need to introduce mechanisms to bring in talent from other countries. Alex Housley proposed to revolutionize the visa system in the UK in order to make it easier for talent to enter the country.

Third, and arguably, most importantly, the stakeholders have to develop a culture that supports AI and innovative trends. We need to make AI a core part of the UK's curriculum on both a formal and informal basis. In other words, as Ankur Modi commented, the UK needs **"to establish a society that has an innovation-first mind-set."**

Jon Andrews shared the PwC 20th CEO survey, published at the World Economic Forum in Davos in January 2017 - revealing that:

- **47% of UK CEOs say they not currently addressing the impact of AI or automation on their organizations**
- This compares to only 31% of CEOs globally and puts the UK far behind CEOs on Germany (19%), the US (32%) and China (31%) in responding to how emerging technologies will reshape their businesses.

The survey illustrates the urgent need to shift cultural norms in order to foster an environment

that is more accepting of AI and, consequently, accepting of the opportunities AI technologies behold in enriching the lives of UK citizens.

Excerpt 10: Alex Housley

Alex Housley
Founder and CEO at Seldon, a company that predicts the future actions of consumers of media and e-commerce services across the web, mobile and tablet. An open-source machine learning platform and infrastructure for real-time recommendations and enterprise-intelligence analytics.

This time last year British artificial intelligence company DeepMind challenged the Go world champion.

And in the end, the computer won.

The reason people went crazy about this, is not only because the computer won. We've seen computers beat people in Chess and Jeopardy with brute force - using processing power to try every possible move.

But it's in the fact that there are more possible board combinations in Go than there are atoms in the universe — winning requires strategy and creativity.

AlphaGo played moves that the professionals had never dreamed of.

4th Industrial Revolution
Harnessing AI will drive the 4th industrial revolution. Science fiction writers - from Mary Shelly to Stanley Kubrick - have dreamed about creating intelligence for decades. In 1965, Irving J Good, Bletchley Park cryptographer, hypothesised that "the first ultra-intelligent machine is the last invention that man need ever make." And long before the recent obsession with AI in industry, the academic world has been openly researching and publishing papers on techniques such as deep neural networks that are responsible for some of the most ground-breaking recent developments.
AI can now fulfil its potential in the real world due to open-source AI software frameworks, massive increases in the availability of data and compute power. We're entering an era of quantum computers that are 100 million times the speed of ordinary computers.

Our Purpose
Machine learning is everywhere in our lives.
It recommends products online, removes spam from your inbox, and decides which of your friends' status updates you should read.
Computers have already acquired superhuman abilities across hundreds of new and very focused domains.
But machine learning can also help us tackle some of the world's biggest problems like
- Drug discovery and image diagnostics in healthcare.
- Predicting crop yields in agriculture.
- Increasing power efficiency - from data centres to the national grid and soon smart grids.

I the founder of a start-up called Seldon. Our purpose is to enable people to make the world a better place with machine intelligence. Seldon's open-source machine learning deployment platform helps data science teams solve problems faster and more effectively. Currently only a couple of percent of machine learning models move from R&D to production, but over 50% of businesses now want to build their own models in house.

We now have a global community of thousands of developers coming to Seldon for their machine learning building blocks. Including some of the world's largest companies like Hewlett Packard and Barclays. We were part of the Techstars Barclays Accelerator fintech program - a shining example of large enterprise driving innovation though collaboration with tech start-ups.

What is AI?
So, what is AI?
Artificial Intelligence is an umbrella term that includes everything from natural language processing to automation.

There has been significant amount of progress in recent years, but researchers are still a long way off developing true artificial general intelligence (AGI) with agents that demonstrate human-level intelligence or super intelligence that goes way beyond. Most of the successful applications of AI today are in fact based on machine learning, which allows computers to solve very specific - or narrow - problems at a superhuman level.

Here's how it works…
In the software development approach, human programmers solve problems by combining rule-based programming with data to produce some output.

Machine learning flips this traditional programming methodology on its head. The raw ingredients for machine learning the expected output and some data set - for most use cases labelled data is necessary for what we call supervised learning.

Sourcing a clean labelled dataset is a challenge that many organisations underestimate.

The data is fed through one or more algorithms to train a model. A model is effectively a computer program designed to do one job well. Generally classifying, grouping, predicting or recommending things.

Deep learning is a part of machine learning inspired by neuroscience. Just as paths strengthen between neurons in the brain as people learn and observe the world; though the training process, connections between the nodes of the neural networks strengthen - and there are levels of abstractions across each layer of nodes as the network figures out its own rules for pattern recognition.

Neural networks have proven themselves have a higher accuracy than statistical approaches, but the results are harder to explain due to the levels of abstraction and complex relationships between the nodes.

In reinforcement learning, agents interact with virtual or real-world environments, learning from a reward function just as people learn in the real world.

Post-jobs world
Previous rounds of automation replaced muscle power with machines, now machines are replacing our cognitive abilities. According to an Oxford study, almost half of jobs are likely to be replaced by cognitive machines within the next 15 years. More than 850,000 public sector jobs could be lost by 2030 through

automation. But there's a shortage of the very people who have the skills to build machine learning models. There will be a $30bn excess demand for data scientists by 2018 in the US alone. Are we moving to a post-jobs world with large parts of society living off some universal basic income or will AI create new jobs? I believe that new jobs will be created, but these must be matched by policies that prevent a polarised post-jobs economy. It's also important that people understand what they can do to adapt such as learning new skills. We're all living longer and machine learning can deliver the economic efficiencies required to help offset the impact of the aging population on the economy.

What is AI to me?

So, what is AI to me?

AI is about using machines to solve new problems. It's about automating and augmenting our decision making. It's about making the world a better place. Embracing AI is one of the biggest opportunities for the UK economy at this time.

But there is a short window of opportunity to build upon the great work that has come before with DeepMind and others. It is critical that the UK fulfils its potential to become the centre of excellence for AI that attracts the world's smartest researchers and entrepreneurs.

As a founder, I call upon the lords, ladies and gentlemen here today, the people of influence in government and industry to consider the once in a generation opportunity that AI presents. AI is a positive revolution that will impact every aspect of our lives.

Thanks to open-source, many of the core technologies are readily available for anyone to use and build upon. We're in a time of exponential change that calls extraordinary collaboration between government, enterprise and start-ups to:

1. Find ways to protect and streamline the visa system to allow global talent in AI to work in the UK.
2. Make AI & machine learning a core part of the UK's curriculum on both a formal and informal basis.
3. Provide additional support for research-based AI companies to play the long game.

Vision

My name is Alex Housley, we're Seldon, and we're building the foundation for you to create the 4th industrial revolution. Come join us!

Need to Capitalize on AI Initiatives

In order to benefit from the AI-friendly environment, the evidence givers also discussed the need for stakeholders to engage in entrepreneurial finance and pass strategic policies to capitalize on the various AI applications.

Currently, in the UK, there is a misalignment in the investing community due to differences in business incentives. Private investors mostly care about short-term opportunity, yet, start-ups and new technologies often have a long term horizon. Hence, it is difficult to ensure capital from these entities without being able to demonstrate outputs and impact.

Growth companies ask that the public sector complements the private sector in more investing opportunities. Ankur Modi discussed how the government should continue to create strategic programmes in which pioneering start-ups can be identified, financed and supported during their efforts. The UK government should also encourage collaboration amongst players in order to create an environment that is most beneficial.

Furthermore, stakeholders, including APPG AI, need to propose ways to measure impact in order to effectively assess the opportunity in a quantifiable manner. Of course, this is a challenging task as many of the impacts are intangible. The first step, however, is gathering evidence from experts in the field in order to be able to draw well-grounded general conclusions and recommendations for how to move forward.

After unpacking AI, the next step is for the UK to design well-informed regulatory policies and frameworks. As AI has different implications in different context, these policies will have to be very sector-specific. Poorly informed regulation can constrain innovation and, ultimate, block economic, social, and environmental benefits society could be endearing.

Respectively, these policies and frameworks have to mitigate the areas of risk within AI and, also, open the doors for areas if opportunity. **Keeping in mind the wider public, the UK must ensure artificial intelligence leads to positive impact for all members of society across all subgroups.**

The APPG AI, using the fruitful discussions from the first Parliamentary meeting, assembled the following recommendations - helping set the agenda for how the UK should move forward within the perimeters of the four key themes identified.

Theme	Action Points
AI is Multi-Faceted	1. Demystify AI and its various parts for key stakeholders and the wider public. 2. Policy Specific Areas: ▪ Education: Include AI within formal and informal curriculums. Invest in higher education, cross-disciplinary AI programmes. ▪ Culture: Encourage public engagement and discourse to familiarize society with

	what AI is and how to use AI. Build feedback loops to understand how citizens use and adapt AI applications in the upcoming years.

AI is Opportunity	1. Gather evidence for AI economic, social, and environmental impact in the UK.
	
	2. Increase funding for research and innovation directed on studying and unlocking the social impacts and benefits of AI.
	
	3. Create directed policies, regulations and frameworks with a sector-specific approach.
	
	4. Policy Specific Areas:
	
	    ▪ Healthcare: Create national standards for data sharing of patient data, while protecting the owners.
	    ▪ Transportation: Reform legal system to address how cars act in human life-death scenarios.
	    ▪ Education: Invest in research to evaluate how AI technologies impact learning. Fund schools and train teachers to use AI technologies within the classroom.
	    ▪ Security: Invest in AI technologies that help prevent crime and security threats.

AI is Transformative	1. Gather evidence exploring AI transformative tendencies.
	
	2. Create directed policies, regulations and frameworks assuring benefits are distributed fairly and broadly amongst all stakeholders and society.
	
	3. Policy Specific Areas:
	
	    ▪ Employment: Train workforce in high and low AI affected sectors with new skills to be competitive in an AI-filled environment.
	    ▪ Equality: Incentivize AI technologies that reduce human bias, and avoid reinforcement of it. Invest in research exploring "data science for social good."
	    ▪ Privacy: Create national standards for data sharing of private data.
	    ▪ Industrial Structures: Invest in research and innovation which are investigating and unlocking shifts in business models and broader industrial structures.

AI is the Road Ahead	1. Encourage an AI friendly environment in the UK.
	
	2. Policy Specific Areas:
	
	    ▪ Public Engagement: Create evidence gathering mechanisms to continue receiving public feedback on how AI is being used and how it is impacting society.
	    ▪ Entrepreneurial Finance: Coordinate efforts and research to make sure investments are strategic and resources are allocated effectively. Focus particularly on companies with technology rich AI-assets and which are ready to grow their markets.

Acknowledgements

The All Party Parliamentary Group on Artificial Intelligence (APPG AI) was set up in January 2017 with the aim to explore the impact and implications of Artificial Intelligence, including Machine Learning.

Contact details

Big Innovation Centre
Ergon House, Horseferry Road
Westminster, London SW1P 2AL

info@biginnovationcentre.com
www.biginnovationcentre.com

www.biginnovationcentre.com