

# EXECUTIVE SUMMARY



## ► The Intelligence Revolution

We are in the early stages of an intelligence revolution. Artificial intelligence (AI) already permeates many aspects of our lives. AI systems trade on the stock market, filter our email spam, recommend things for us to buy, navigate driverless cars, and in some places can determine whether you are paid a visit by the police.<sup>1</sup>

Although AI is not new, there has been a recent explosion of activity and interest in the field which has largely been driven by advances in machine learning. These are computer programs that automatically learn and improve with experience.<sup>2</sup>

Progress in machine learning has allowed more versatile AI systems to be developed that can perform well at a range of tasks, particularly those that involve sorting data, finding patterns, and making predictions.

## ► Opportunities and Risks

The fast-moving development of AI presents huge economic and social opportunities. Over the coming years AI will drive economic productivity and growth; improve public services; and enable scientific breakthroughs.

But there are also risks. The intelligence revolution will cause great disruption to employment markets. Concerns about privacy and accountability will be amplified as AI makes possible increasingly sophisticated analysis of our personal data. And

the ability of AI to replace humans in military decision-making raises profound questions.

The more distant future is hard to predict. Oxford University Professor Nick Bostrom and others have speculated about the catastrophic risks of a 'super-intelligence' that humans struggle to control. While Bostrom's doomsday scenario may be extraordinarily unlikely, the possibility of it happening only needs to be extremely small for it to warrant attention.

## ► The UK's Unique Position

The UK was the crucible of the industrial revolution and is one of the key crucibles of the intelligence revolution. It is home to world-leading AI companies and world-leading academic centres of AI research, and is well placed to reap great economic and social benefits from the development of AI.

The UK also hosts world-leading academic centres focused on the safety of AI.<sup>3</sup> This, alongside the UK's membership of key multilateral policymaking fora such as the G7, G20, NATO, UN, and OECD, means the UK could and should play an important role in shaping and directing global debate and ensuring that the opportunities of AI are maximised and its risks are minimised.

## ► Engaging the Public and Politicians

As part of our research for this report we commissioned a YouGov poll to assess British public opinion on a range of issues relating to AI. The results of the poll are featured throughout this report.

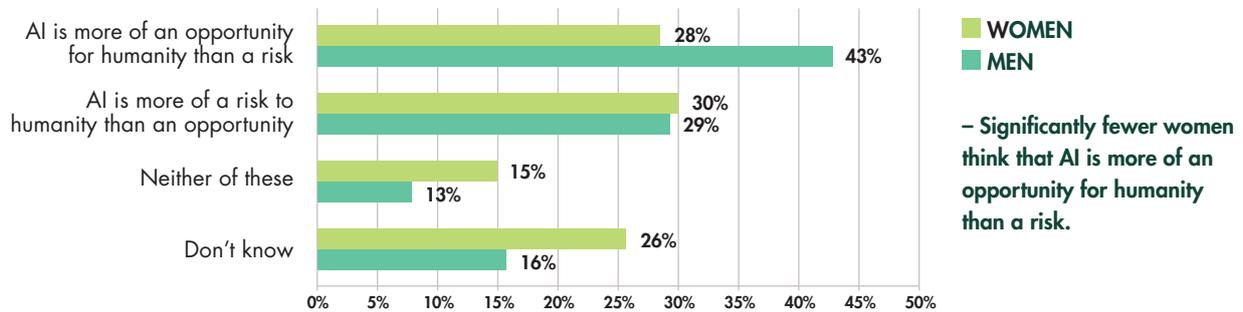
1. The Chicago police department have used predictive policing to visit those at a high risk of committing an offence to offer them opportunities to reduce this risk, such as drug and alcohol rehabilitation or counseling. See Saunders, J., Hunt, P., & Hollywood, J. S. (2016). Predictions put into practice: a quasi-experimental evaluation of Chicago's predictive policing pilot. *Journal of Experimental Criminology*, 12(3), 347-371 and Stroud, M. (2016, 19 August) Chicago's predictive policing tool just failed a major test. *The Verge* (retrieved from <http://theverge.com>, accessed on 11 October, 2016). Areas of the UK, such as Kent, are beginning to use predictive policing. E.g. see O'Donoghue, R. (2016, 5 April) Is Kent's Predictive Policing project the future of crime prevention? *KentOnline* (retrieved from <http://kentonline.co.uk>, accessed on 11 October, 2016).

2. Mitchell, T. (1997) *Machine Learning*. London, UK: McGraw-Hill Education.

3. These include Cambridge's Centre for the Study of Existential Risk and Oxford's Future of Humanity Institute.

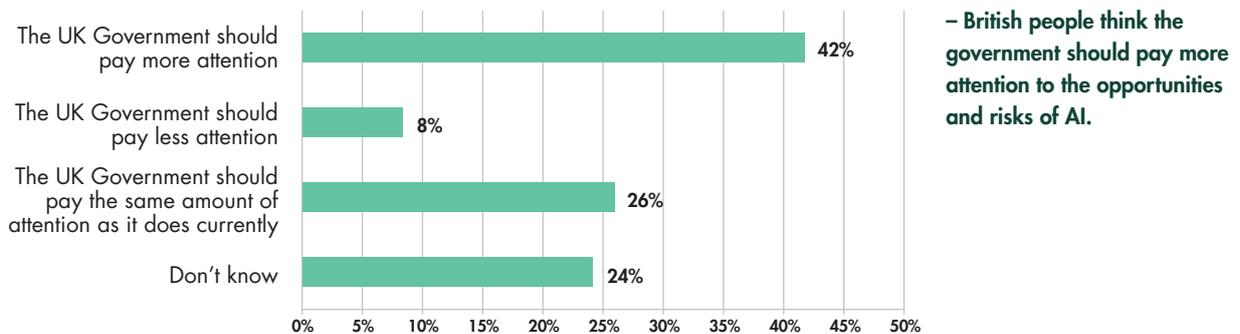
► **YouGov Poll Graph 1**

Which ONE, if either, of the following statements BEST describes your view towards Artificial Intelligence (AI)?



► **YouGov Poll Graph 2**

In general, do you think the UK Government should pay more or less attention to the potential opportunities and risks of Artificial Intelligence, or the same as it does currently?



All figures, unless otherwise stated, are from YouGov Plc. Total sample size was 2070 adults. Fieldwork was undertaken between 10th - 11th October 2016. The survey was carried out online. The figures have been weighted and are representative of all UK adults (aged 18+).

We need to have a much deeper and more informed public debate about AI in order to build the trust, understanding, and acceptance that are vital to realise the benefits of this technology and to ensure that AI is developed in ways that fit human wants and needs.<sup>4</sup>

We also need to have a much deeper and more informed political debate about AI.<sup>5</sup> The words 'artificial intelligence' have only been said 32 times in the House of Commons since electronic records began, compared to 923 for 'beer' and 564 for 'tea'. Hopefully the recently published report of the

Science and Technology Select Committee into Robotics and AI<sup>6</sup> will provide much-needed stimulus.

Our recommendations to the UK Government are summarised below. The Government is not the only important actor in this space, but it does have a vital role to play, alongside industry, AI researchers, the media, and the public.

We welcome discussion as well as critique of our recommendations with the intention that this report will help stretch political horizons and shape an increasingly informed public debate on this dynamic and important subject.

4. Some commendable work has been undertaken in this area, notable examples including the Royal Society and Nesta, and these will serve as useful starting points for wider public discourse.  
 5. There is some promising work within the Civil Service in this regard, notably the Government Office for Science's forthcoming report on AI and governance; and published ethical guidelines on the use of data science tools for government analysts.  
 6. Science and Technology Committee (2016, 12 September) *Robotics and Artificial Intelligence*. HC 145 2016-17.

# SUMMARY OF POLICY RECOMMENDATIONS



## ▶ **The UK Government should:**

- 1. Make** the AI opportunity a central pillar of the Prime Minister's proposed industrial strategy and of the trade deals that the UK must negotiate post-Brexit.
- 2. Commission** UK-specific research to assess which jobs are most at risk by sector, geography, age group, and gender. And then implement a smart strategy to address future job losses through retraining, job creation, financial support, and psychological support.
- 3. Draft** a White Paper on adapting the education system to maximise the opportunities and minimise the risks created by AI.
- 4. Agree** a 'new deal on data' between citizens, businesses, and government with policies on privacy, consent, transparency, and accountability through a nation-wide debate led by a respected and impartial public figure.
- 5. Promote** transparency and accountability in AI decision-making by supporting research that facilitates an opening of the 'black box' of intelligent algorithms and supporting open data initiatives.
- 6. Establish** systems of liability, accountability, justification, and redress for decisions made on the basis of AI. This would promote fairness and justice, and could encourage companies to invest in more transparent AI systems.
- 7. Support** a ban on Lethal Autonomous Weapons Systems (LAWS) and work with international partners to develop a plan for the enforcement of the ban and for the prevention of the proliferation of LAWS.
- 8. Give** appropriate attention to long-term issues of AI safety: support research into AI safety and horizon scanning; support the institutionalisation of safe AI research conduct in all sectors including the development of a code of ethics; develop standards and guidelines for whistle-blowers; and ensure students and researchers are trained in the ethical implications of their work.
- 9. Facilitate** a House of Commons debate on maximising the opportunities and minimising the risks of AI in the UK.
- 10. Establish** a Standing Commission on AI to examine the social, ethical, and legal implications of recent and potential developments in AI.
- 11. Develop** mechanisms to enable fast transfers of information and understanding between researchers, industry, and government to facilitate swift and accurate policy-making based on fact.
- 12. Launch** a prize for the application of AI to tackling today's major social challenges and delivering public goods.

