

# The Future of Trade

**'Who, what, where & how'**  
automation and artificial intelligence  
are disrupting the marketplace

A think piece prepared for Innovate UK



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**The Future of Trade** is a 'think piece' based on interviews with thought leaders, executives at global businesses and founders of start-ups and service providers during February and March 2017. Evidence is also from the Hot Topics Debate on 'The Future of the Office' among AI experts at the Big Innovation Centre, held on 20 April 2017.

The evidence presented in the report is not exhaustive but reflects the views and experiences put forward by the people and what was discussed at the debate. Written submissions by individual expert advisors are also included. The report does not seek to be definitive. Instead it aims to provide a provocative picture of how trade might be transformed by automation and artificial intelligence in the future.

*Professor Birgitte Andersen, CEO & CoCreator (Chair of Project)*

*Sean Farrell, Journalist*

*Niki Iliadis, Business Intelligence Researcher in Open Innovation*

*Maria Ponce, Project Manager*

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*Any enquiries regarding this publication, contact:*

*Professor Birgitte Andersen*

*BIG INNOVATION CENTRE*

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# Executive Summary

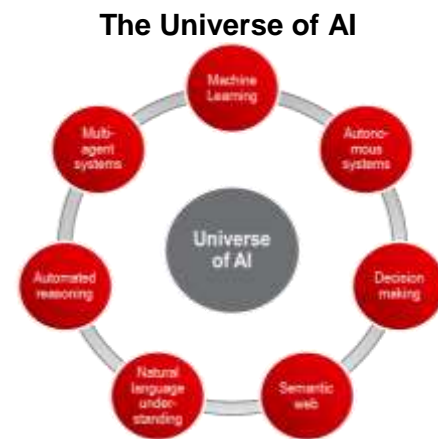
Artificial Intelligence [AI] has already affected and impacted processes and models across industries, sectors, and geographic borders. Furthermore, given the trend of exponential technological growth, it is anticipated that its volume of impact will spike in the next couple of decades. However - although stakeholders recognize its substantial economic and social impact – the potential impact of AI remains a research frontier relatively unexplored. In consequence, there has been a significant push recently to gather evidence to understand AI's transformative and disruptive tendencies.

This report aims to contribute to this quest by focusing on how AI is transforming and disrupting the sphere of trade. **Through a series of interviews with thought leaders, executives at global businesses and founders of start-ups and service providers the report illustrates how AI has changed processes, models, and norms linked to trade.**

## THE AI UNIVERSE

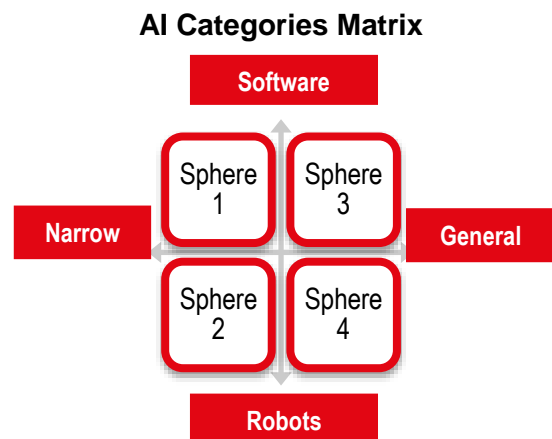
The AI universe underpinning new trade processes is still mainly defined through research and technology development paradigms, focusing on **machine learning, decision making, natural language understanding, automated reasoning, autonomous systems, multi-agent systems and semantic web.**

AI is mainly implemented in more **narrow applications to support specific trade tasks**, although we often think of AI in more **general terms** (closer to science fiction) in which it overtakes human brains. Also, AI is often a **software programme** and not a **physical robot** as in the case of the driverless car.



## TOWARDS AI COMMERCE

We can map a technology trade trajectory from analogue trade (broadcasting and phone orders) to e-commerce where the Internet sparked a revolution for online procurement through online catalogues, the shopping trolley, new business models around peer-to-peer auctions, price comparison sites for anything (starting with holidays), and online payments. But the current revolution in **AI commerce** disrupts everything we know in supply and demand economics about how markets work. Conventionally, markets tend to be classified by their degree of competition or the number of buyers and sellers





bargaining a price, and the e-commerce revolution enforced this model. Beyond supply and demand, there is little discussion about the structuring of specific market structures. However, AI serves as a disruptive force, transforming these specific market structures.

### AI MARKET INSTITUTIONS

Supply chains are being completely reconfigured and most commercial market transactions underpinned by AI commerce do not take place in competitive market arenas as we now know them. Individuals and businesses are involved in ongoing, more intensive bilateral relationships in which they exchange data and information. The new market institutions in which trade itself is conducted are 'intelligent agents' (such as chatbots and Alexa) interacting directly with consumers and clients, 'Internet of things' organizing the buy-side (e.g. via connected homes and smart grids), 'information exchanges' via online emerging data driven platforms, and the contract itself, which will be processed through a **blockchain** mechanism and smart contracts.

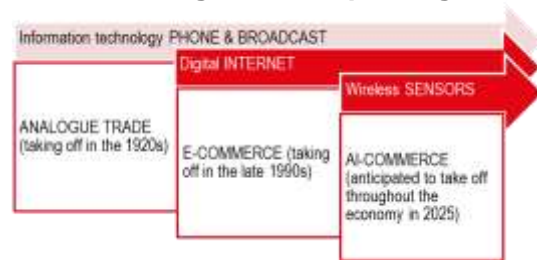
### DRIVERS IN AI COMMERCE

The drivers are transaction cost efficiency as trade processes will become **faster** and 'smarter' via connected data. Despite being **automated**, trade will be customer centric and totally **bespoke**. Most of all, it will be **cheaper**.

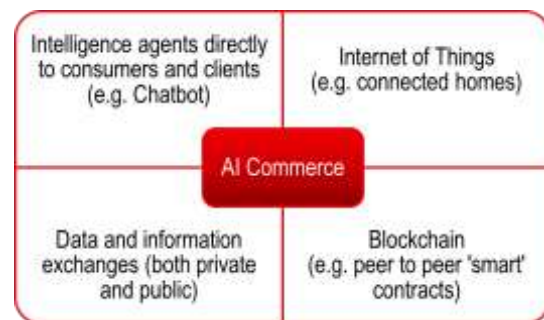
### MARKET COMPETITION

This trade transaction is different from the exchanges in traditional markets, as we commonly tend to think of them. The relational exchanges between buyers and sellers are still competitive but the focus now lies on **personal and business data access**, which used to be separate from market exchanges but now play a *direct* and *key* role in the transaction. We can think of it as a 'social contract' underpinning the trading contract, as you cannot trade unless you disclose your data in public or privacy commons. It is the same case for business to business competition in supply chains. The 'social contract' for data exchanges will probably underpin all AI trade contracts in goods and

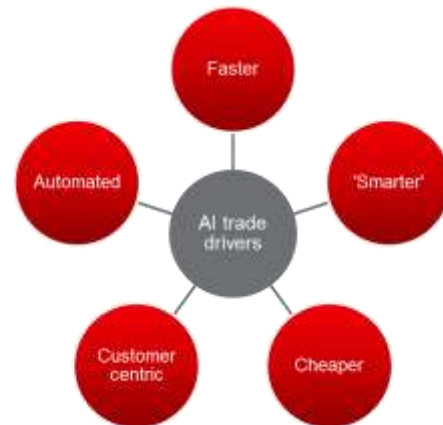
### Technological trade paradigms



### The new construction of AI market places



### Five AI drivers in trade



services in the future. A second factor in market competition is the **AI technology capabilities** of the trading organizations, and the ability to build and control **unique platforms**, the third factor, on which users can connect. The **market offerings** of products and services - the conventional source of market competition – will become the least important element, as profit margins are expected to be very low or zero.

### 2025 TIMEFRAME

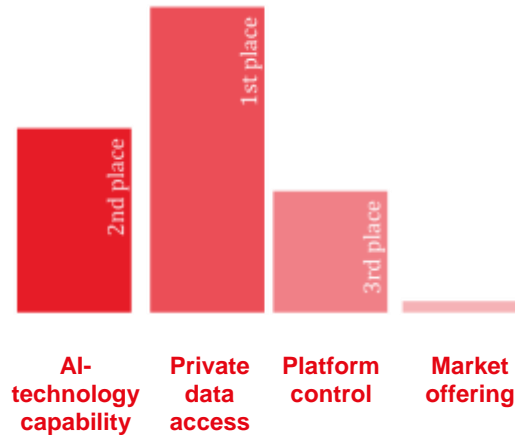
The year 2025 is a reasonable time to expect AI commerce to have taken off in a big way throughout the economy.

### REGULATION AND GOVERNANCE IN AI COMMERCE

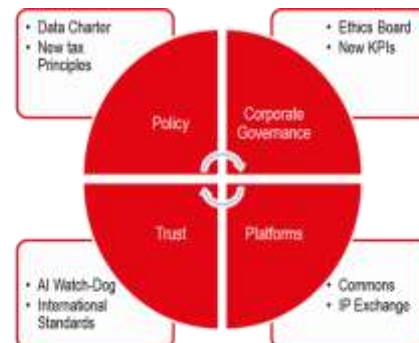
As we learned from the e-commerce revolution, new markets are not self-adjusting, but a hybrid between the free market mechanism and a man-made construction. To make AI commerce a reality, it must be underpinned by policy, regulation, shared platforms, and public trust. Hence, it is vital for stakeholders to act strategically to ensure AI transforms trade for the better. We propose a public **data charter** on how personal and business data can be used and **ethics boards** in companies setting transparent principles on how data will be governed. There should be an **AI watchdog** around which consumers can unite and enforcing expected trading standards, and there must be opportunities **for equal access to platforms** on which the new AI commerce resides. To this we can also add a further dimension of complexity in transfer pricing of intangible assets (courtesy of OECD's recently introduced guidelines to tackle Base Erosion and Profit Shifting, BEPS) and **intangible trade reporting** to reduce the chance of further opportunities for tax avoidance on non-physical trade.

### Competition factors in AI markets

And the winner is ....



### Making the AI revolution real



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# 1. From Analogue Trade to E-Commerce to AI-Commerce

Sixty years after Alan Turing asked, “*Can machines think?*” artificial intelligence has now become a key topic across sectors and industries. Driven by a surge in computer power and an explosion of data, technologies that until recently were perceived as science fiction are now embedded within our daily routines.

These include: Apple’s Siri voice recognition system, online chatbots that can answer questions, and computer programs that can defeat humans at games such as chess and Scrabble. Driverless cars have been introduced on US streets and are expected to also enter the UK market soon. The Internet of Things allows our appliances to talk to each other, order products and, increasingly, organise our lives.

These are only a few examples of the capabilities of emerging technologies and the reality is they are developing at exponentially faster speeds.

At its heart, AI is about innovation and making life easier for individuals and businesses. With preparation and appropriate policy responses, the oncoming AI revolution has the potential to free us from routine tasks, strip out needless processes and open up new opportunities for individuals and businesses to focus on what is important. The UK’s All-Party Parliamentary Group (APPG) on AI started gathering evidence on the complex impacts of AI in March 2017 - considering the opportunities and innovative power of AI while addressing concerns about its potential social impact.

In that spirit of innovation, **this report focuses on the impact of AI on the trading of goods and services** – the billions of transactions that make economies tick and create wealth and prosperity. From consumer

## AI – The Big Picture

We have entered what the writers **Erik Brynjolfsson** and **Andrew McAfee**, in their best-seller *The Second Machine Age*, refer to as a period of exponential growth for AI. They suggest that rather than thinking of technological progress in straight lines, society should view it in exponential terms. Hence, in the next five or ten years, technological developments are anticipated to surprise us and disrupt our lives far more than the changes that occurred in the past decade.

The magnitude to which AI will impact society is debatable. If AI is - as some commentators believe - moving from its current narrow constructs to more general intelligence, this will have monumental, life-changing consequences for how the world is organized. But even if AI’s development remains restricted to multiple individual tasks, it will still transform the way businesses and individuals interact.

The dawn of the AI age portrayed above has been greeted with a mix of both optimism and concern. Reports predict that large swathes of jobs now linked to humans will soon be performed by machines - equipped with software that enables them to perform at a super-human level, never getting bored, tired or ill and immune to human error.

Policy makers across the world have begun to investigate the likely impact of AI’s potential. In October 2016, reports were published in the US and the UK broadly welcoming the advances promised by AI but, also, raising concerns about its impact on justice, fairness and accountability.

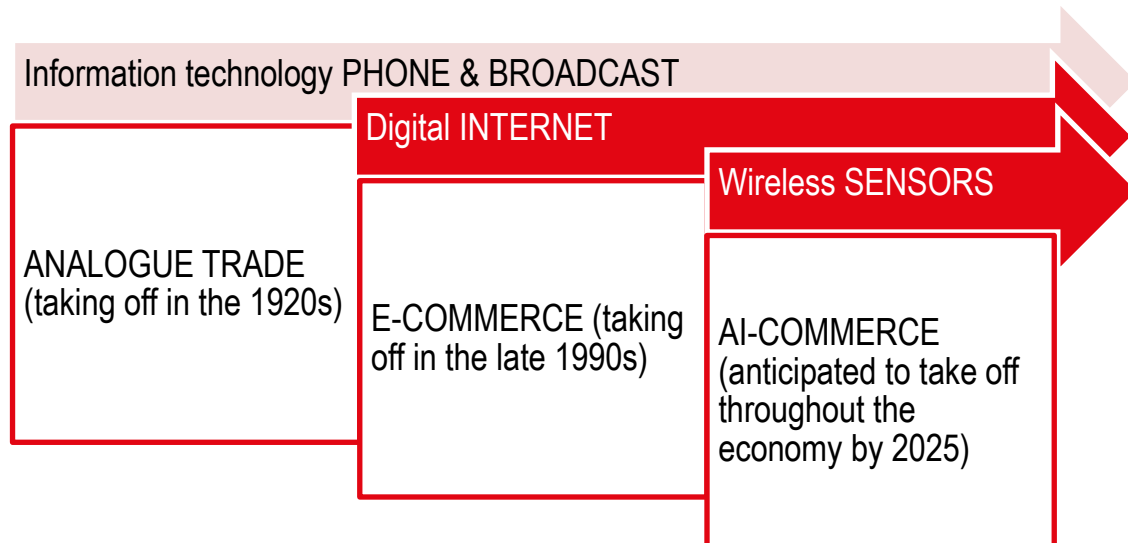
The UK’s Royal Society’s review of machine learning argues adoption of new techniques has been patchy in certain sectors of British industry. The report offers a list of recommendations for business and the government to fulfil the utmost potential for machine learning. some of

goods to legal services to the financing of international trade, no sector, market or supply chain will be untouched by the AI revolution.

The path of technological progress in the past couple of decades can be traced from the rise of the internet to social media to the advent of big data to the Internet of Things and, now, to the implications of an AI future. Clearly, the imminent AI revolution is a direct consequence of the digital internet revolution that blossomed a few decades ago. The rise of e-commerce has spawned the AI wireless revolution by equipping innovators with the means to power technologies which were previously unused. AI, in turn, makes increasingly better sense of the big data, which in turn powers further developments in AI, with new information and opportunities for learning.

It is important to understand the trajectory of technological progress as well as how each stage builds from the other to comprehend the transformational and disruptive tendencies. Traditionally, society processes behaved under the norms and rules of commonly known supply and demand models. Information technology and the creation of the phone and broadcast brought about analogue trade. Then digitisation, especially the introduction of the Internet, transformed conventional transaction processes through e-commerce. Society started to buy, sell, transfer, and exchange products, services, and information via electronic networks (the internet) and computers. Today, these processes are once again being disrupted through the deployment of various AI technologies.

**Figure 1. Technological trade paradigms**



The process of digitisation took off with the spread of the internet, which allowed individuals and businesses to manage their affairs on computers. As Rodolfo Rosini, CEO at Weave.AI, explains, there was a further surge with the development of smartphones and tablets, whose addictive qualities gave rise to still more data as people increasingly ran their lives on the move. This is what Brynjolfsson and McAfee call “the digitisation of just about everything” and has resulted in 95% of the world’s data being created in the past five years.

“I’ve spent seven years as an entrepreneur and I can tell you my peers and I have been surprised by the pace of change.

**The reason AI is exploding is we have two billion people with devices that generate data.** It’s a direct result of the fact we have two billion smart phones. Without smartphones and the internet this couldn’t happen.

Over the past two years it exploded where the large incumbents like Facebook and Google discovered AI and repurposed themselves as AI businesses. It has happened in the US and China. **The UK is completely unprepared. There isn’t a single large AI company in the UK.**

The risk is we are disrupted by forces not under our control. By linking to enough data, AI can predict what we will do next with pretty scary accuracy. With the right inputs, AI can generate the right response and can find something irresistible to us.”



**Rodolfo Rosini**  
CEO  
Weave.AI

Digitisation brought about AI developments and the Internet of Things, now driving development of new platforms to allow devices and appliances to communicate with each other. This concept, which a couple of years ago was exemplified by the idea of the self-filling fridge, has expanded to include the prospect of autonomous agents organising all aspects of our lives – from our car to our diary to our diet.

Many companies are still developing their digital capability and are examining ways to graft AI on top as the enabler to fulfil their potential. Yet, the launching of mind-blowing developments is becoming more and more of a common trend. As explained in Section 3, the introduction of intelligent agents is completely transforming the commercial arena. For example, Amazon’s intelligent

assistant Alexa was made available for general use in mid-2015 and is estimated to be available in more than 5 million US homes through the Echo speaker. Alexa has competition from Google, Microsoft and others but its early success suggests it, or something like it, could be a platform not only for consumers to request music or buy goods but also for companies to provide services for consumers and business customers.

Different sectors – and sometimes different subsectors – are in varied states of readiness, as the Royal Society pointed out in its report on machine learning.<sup>1</sup>

<sup>1</sup> The Royal Society. *Machine Learning: The Power and Promise of Computers that Learn By Example*. 2017. <https://royalsociety.org/topics-policy/projects/machine-learning/?gclid=CNDhoe-Pi9QCFcKfGwodXC8LSA>

Retailers have been building up data that helps them understand customer behaviour and the big four consultancy houses, which advise companies on their digital strategies, are aiming to keep up with the pace of change.

International law firms are currently using digital technology mainly for their own purposes, but also aiming to use AI as a means to serve clients. But as highlighted by

Charles Kerrigan, Partner and Head of International Finance Practice Group at CMS, making a disruptive change to your routines is a tricky road, and in the AI case, it throws up the question of data as the new competitive element as opposed to time-cost reporting (which is also discussed further in Section 3).

“All these things are to some extent information and data problems. One of the issues we have as lawyers is we don’t really measure anything except the number of hours we work. **I’ve spent the whole of my career in an analogue way trying to wrestle with that problem.** As lawyers we need to be much better at that to help products develop. Insurers know what premium to charge for an insurance product because they have got so much data.”



**Charles Kerrigan**  
*Partner and Head of International  
Finance Practice Group  
CMS*

In the report thought leaders propose main developments for AI trade in selected sectors:

- **Financial services (focusing on trade finance):** AI will augment blockchain technology to do away with cumbersome paper trails in favour of transparent, secure payment processes with the potential to reduce costs, optimise supply chains and encourage international trade.
- **Fast moving consumer goods:** supply chains and products will be transformed as producers connect directly with consumers and AI takes over shopping for households. Retailers could be substantially cut out of the supply chain and AI will help optimise factory production and deliveries.
- **Knowledge-based business services:** accountancy and consulting advice will be available directly to clients via 24-hour available apps and intelligent agents, prompting a shift from time-charging contracts to managed service contracts. Law firms may be forced to emulate this hub model as AI encroaches on the work done by lawyers.
- **Energy:** For households, energy use will become integrated with usage of appliances as the Internet of Things and intelligent agents provide a concierge service. Energy providers may need to find ways to participate in a

disintermediated market as blockchain technology allows consumers to trade energy use.

- **Emerging Platforms:** The processes of technology transfer and information commerce will be reframed within societies. Platforms, built on the values of open innovation and data sharing, will be created. Access to more data will result in better models that can open doors to solving existing market inefficiencies, reducing costs and increasing profits.

## Report outline

In this report, we sought the views of thought leaders, executives at global businesses and founders of start-ups and service providers to chart a path to 2025. The result was a collection of varied and vivid views of how AI will change trading arrangements – between businesses and consumers, from company to company, in the facilitating of trade and resultant new business models. The emphasis is on AI’s innovative power rather than its unsettling aspects.

Big questions this report addresses:

- **What is AI in trade? (types and categories of AI)**
- **What are the disruptive market institutions in AI commerce?**
- **What are the drivers in AI commerce?**
- **What are the competition factors in AI markets?**
- **What is the time frame for AI commerce to take off?**
- **What is the regulation and governance to unlock the new trade paradigm?**

The report does not seek to be exhaustive or definitive. Instead it aims to provide a provocative picture of how trade might be transformed in the near future.

## 2. What does AI mean for trade?

Before seeking to understand AI's impact on trade it is imperative to have an understanding of what artificial intelligence means as a broad concept.

Currently, there is no universally agreed definition of AI. AI is made up of several research disciplines and has multiple components – as shown in Figure 2.

The lack of a universally recognised definition of AI is a double-edged sword. Overall, the subject's loose definition has helped AI move forward as technologies lose their novelty and merge into the general category of computer science.<sup>2</sup> On the other hand, however, the vague definition of AI makes it challenging to anticipate its impact in different sectors such as trade.

Ben Taylor, Chief Executive of Rainbird, whose platforms are used by businesses to develop AI capability, argues this constant reclassification of AI technologies – and current talk of an extraordinary period of progress – obscures the contribution AI has been making over many years.



**Ben Taylor**  
CEO  
Rainbird

**“People tend to see AI as new technologies and then they become mainstream computer science and they are no longer considered AI.**

When I started in AI in the late 1990s rote learning was very firmly part of what was considered AI but is now a routine part of any computer science course. A large number of equity stocks on most markets are traded by algorithms. We wouldn't consider that AI but all computerisation is really a form of AI.

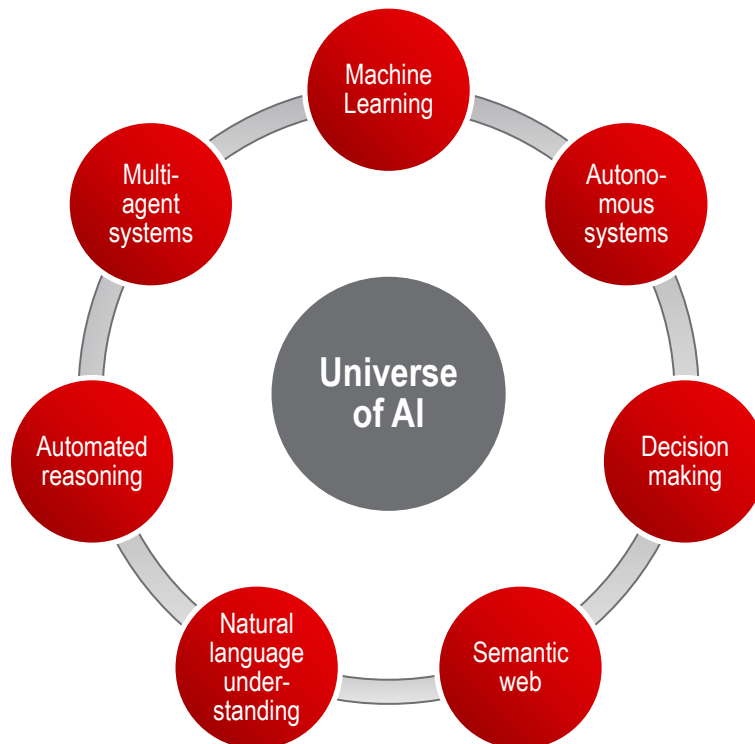
**There is lots of discussion about how AI is going to change the landscape but there is a strong argument that it has been happening for a very long time.”**

<sup>2</sup> [Artificial intelligence and life in 2030](#), Stanford University September 2016



For a current overview of the market scope of the AI technologies, Michael Wooldridge, Professor of Computer Science at Oxford University, has broken AI down into the following elements presented in Figure 2, and defined underneath.

**Figure 2: The Universe of AI**



- **Machine learning:** enabling machines to learn how to perform tasks without being explicitly told how.
  - Marketing personalization is just one example of how machine learning is used. Someone might visit an online store and look at a specific product. In the following days, he or she might see digital ads across the web for that exact product.
- **Decision making:** enabling machines to make decisions on behalf of people in situations where the decisions are complex or poorly specified.
  - Decision-making algorithms are used across business sectors. For example, algorithms are used to sift job applications, assisting the recruitment process when interviewing potential candidates.
- **Natural language understanding:** enabling machines to interpret and interact in ordinary human languages such as English, French and German rather than in machine-oriented programming languages.
  - Financial markets use natural language processing to analyse text factored into algorithmic trading decisions.
- **Automated reasoning:** enabling machines to derive new conclusions from existing facts or data in a robust way.

- The most developed areas of automated reasoning include automated theorem proving and automated proof checking, using computer programs that reason completely automatically.
- **Autonomous systems:** enabling machines that can carry out delegated tasks on our behalf without being explicitly told how to carry out the task.
  - It is a network or collection of networks that are all managed by a single organization or entity.
- **Multi-agent systems:** enabling AI systems to cooperate with each other, for example by forming teams to carry out tasks that are beyond the capabilities of any individual team member.
  - Computer games are a very common example of multi-agent systems, made up of multiple interacting intelligent agents within an environment.
- **Semantic web:** enabling computers to understand and reason about the content of web pages so that browsers can make smarter decisions about what to do with the content.
  - This is a proposed development for the global web so that web pages can be structured in a way for computers to be able to read them directly.

These elements are in use already in a variety of technologies – from the robots that swarm around Ocado’s giant warehouses fulfilling orders to the chatbots that answer consumer queries and intelligent agents that help organise our lives to the software that searches for low prices or helps organise logistics.

The AI scope in trade can be described by its technological offering.

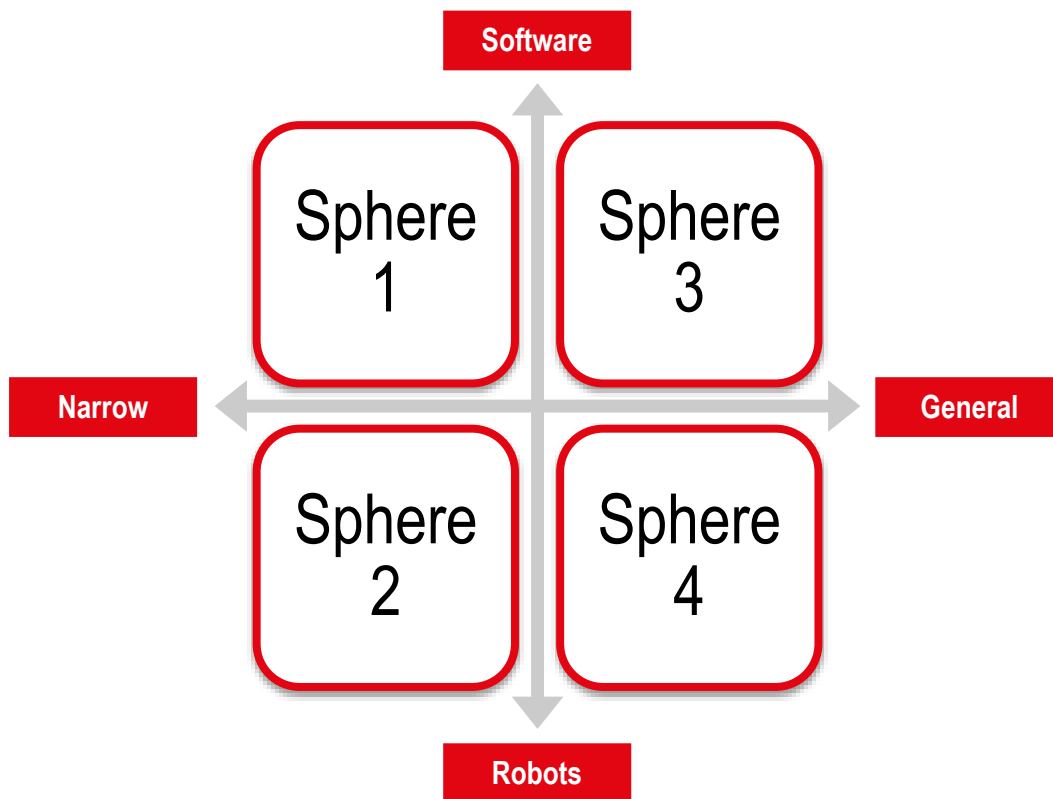
AI is often divided into the categories of narrow and general – a distinction that crops up in this report.

- **Narrow, or vertical,** AI is a technology that performs a specific task such as playing Jeopardy! or finding a song you like.
- **General** AI gets us closer to science fiction, promising a world where a computer can emulate the human brain to perform any intellectual task.

Furthermore, AI technologies can also be divided into two other groupings: (1) **physical robots** such as driverless cars and (2) **software programmes**.

When people think about AI, they tend to concentrate on the general-AI robots depicted in science-fiction Hollywood movies. However, reality is that the majority of AI technologies currently being developed fit the narrow category and are software programmes. Hence, this report focuses on the impact of AI technologies belonging, firstly, in Sphere 1 and, secondly, in Sphere 2.

Figure 3: AI Categories Matrix



A key enabler for how AI is used in trade is digitisation. It feeds the sensors and algorithms that power the new technology. The growth of digital data resulting from the internet, smart phones and social media has also been partly fuelled by AI, although most digital technology is not AI.



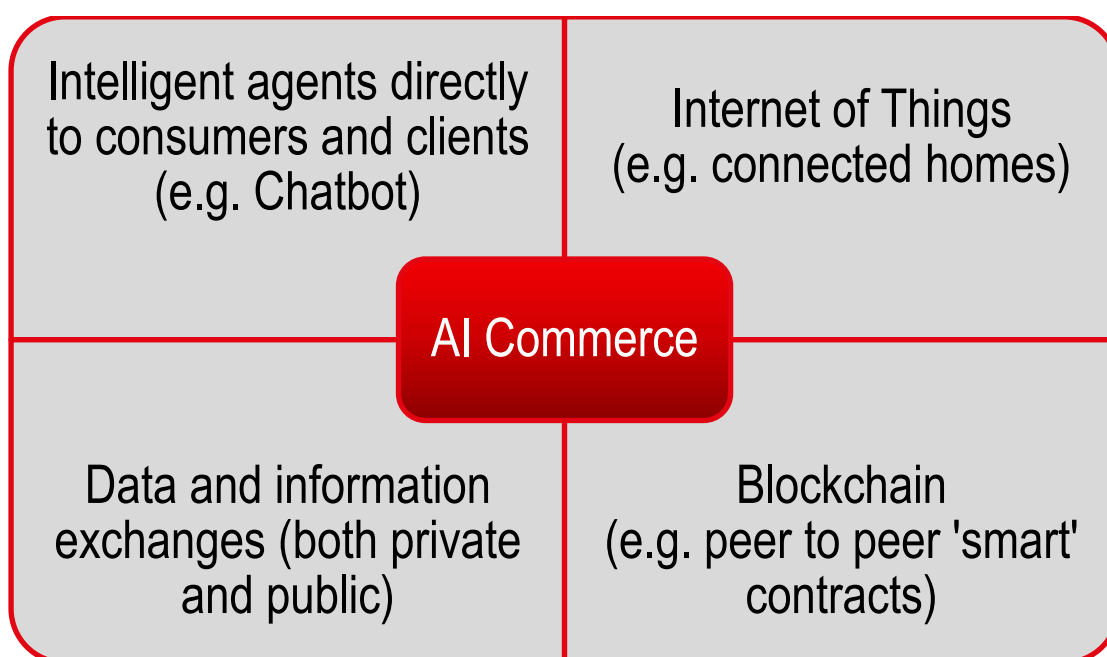
**Peter Bentley**  
Chief Technology Officer  
Braintree

**“What we dream of is an AI assistant that understands us and our needs and helps us navigate this never-ending amount of data** to the point where it helps us find the right restaurant running our lives a bit more efficiently. I don’t mean the current AI stuff that predicts what we will like because a lot of us don’t want to be force-fed the same diet. We need a deeper understanding. If my mood is different I may or may not like more variation and depending on the time of day I may want to watch a certain time of programme.”

### 3. Reshaping of market institutions

If the coming AI revolution makes the impact it is expected to make, all industries will be affected in one way or another. The processes for how goods and services are traded will be disrupted. Supply chains will also be disrupted – sometimes reconfigured and sometimes with whole chunks becoming redundant. Suppliers of products will deal more directly with consumers as those products are tailored to individual tastes. Procurement, invoicing and delivery will all be made more efficient as AI pulls costs down.

Figure 4. The new construction of AI marketplaces



The overriding picture that emerges is of *more efficient production, better-connected consumers and greater access to markets*. From the assembly line, whether physical or knowledge-based, to the delivery of products to the consumer, supply chains will be shaken up.

#### Intelligent Agents

Smart assistants, intelligent agents, chatbots – there are many names for AI's personal helpers and there is little doubt they will be at the centre of the coming transformation. Consumer-facing companies are already using their own chatbots to interact with customers and answer simple questions online. These will become ever more able as data and innovation converge.

AI will put companies in more direct contact with consumers, changing the way products are designed and cutting out parts of the supply chain. Fast moving consumer goods (FMCG) companies are already using digital technology to find out more about consumer tastes to tweak or create new products. As an early example, Unilever has

created Chef Wendy, a chatbot that gives out recipe tips for its Knorr soup brand in response to consumer enquiries in developing markets. The company is also seeking to tap into social media and messaging services and has used chatbots on Facebook to encourage regular toothbrushing while promoting its Signal toothpaste.

There is another breed of assistant that has the potential to become a more general platform for interaction between businesses and customers.

Amazon launched its Alexa personal assistant two weeks after admitting defeat for its Fire smartphone with a \$170m write-down in late 2014. The scrapping of Fire seemed to signal an end to Amazon's chances of developing a way of reaching consumers that would rival Apple's iPhone and Alphabet's Google search engine. But Alexa, a voice-based programme housed in a speaker called the Echo, has caught on. It was released in the UK in September 2016. The company does not disclose how many Echos it has sold but Jeff Bezos, Amazon's founder, says the company is not making enough to keep up with demand. Amazon is encouraging companies, including competitors, to put their own apps – or “skills” – on to Alexa and is providing funding for smaller businesses to do so.

David Ferguson of EDF Energy says Alexa and other forms of AI are going to radically change the way his company engages with customers. He says all companies are looking at Alexa as a means of interacting with customers but are, simultaneously, asking what comes next. Amazon has competition from rivals such as Samsung and Google, raising the prospect of a battle to be the dominant voice agent. Peter Bentley of Braintree believes that whichever platform succeeds will likely develop capabilities far beyond the basic commands being processed now.

### **Amazon, what's my account balance and what is my consumption? – EDF Energy's experience**

EDF Energy has done quite a lot of work with chatbots and messaging platforms such as Facebook messenger to discover if people can effectively automate a lot of these tasks. The company expects tasks performed by Alexa to become more advanced in the next few years. EDF Energy worked with Amazon prior to Alexa's launch in the UK and was one of the launch partners.

In EDF Energy's experience, Alexa has been something customers really like and find very engaging. A major focus for EDF Energy this year will be how they build on these skills so customers can begin to ask questions like why and what have I done?

Professor Michael Wooldridge believes Alexa and its current rivals are likely to be superseded by something else as the pace of change picks up, but that the devices serve as a pointer towards the future. For consumers, something like the Google glass experiment, which was scrapped in 2015, will emerge to shape our choices of goods and services, he argues.

"I think we will see something grow out of things which are there now. We are currently in the middle of a mobile revolution that started in 2010. The next innovation will be connected with that mobile technology. **Having something transform our reality according to what we are interested in would be huge.**

You will have something helping you understand the world around you. I suspect Amazon Echo will be a toe in the water – it will be a mobile experiment. Whether it is an object like Echo or on your phone having AI help you in the world is a very natural idea."

**Michael Wooldridge**  
*Professor*  
*University of Oxford*



Ultimately, intelligent agents will completely transform business routines and processes – making them easier and faster. As Paul Clarke explains, through the use of big data, decision-making models and negotiations will be transformed. Access to more data means more information; hence, decision-makers can make better decisions and add value to their businesses.



"You will need AI to keep up as our world gets more highly served and you decide who to share your data with. **Smart agents will be able to sell your data because it has value.** You can imagine smarter negotiations going on in real time as you walk down the street."

**Paul Clarke**  
*Chief Technology Officer*  
*Ocado*



## Internet of Things



“The market will be AI and each individual purchaser and seller will have AI. A lot of intermediaries will get removed. There is no need to have distribution and it may be that retail in the old-fashioned sense will become irrelevant. The act of buying a fast-moving consumer good is going to be very automatic. Once an object is designed, the process will become very automated. **There is very little use for humans in repeat transactions. What happens when the Internet of Things comes in is you will see many devices carrying out transactions.** A fridge that orders milk is likely to be a reality. Your printer should be sorting out its own cartridges.”

**Mike Lynch**  
*Founder*  
*Invoke Capital*

The Internet of Things, or IoT, is a term used to explain the inter-networking of physical devices as well as software. It uses automated systems to connect devices to help someone with a particular task or learn from process. IoT allows individuals and businesses to be more efficient when doing things, and has caused companies to re-think how they deliver services and produce goods.

It is transforming the way businesses interact internally but also the relationship they have with their clients or customers.

Our interviews suggest this direct contact with customers is just the start of the shake-up in the FMCG supply chain, which is ripe for disintermediation.

Amazon has been working on ways to automate ordering of goods for several years. Its Dash service, which supplies buttons for specific products in homes allowing consumers to press when they run out, is a harbinger of how the Internet of Things could streamline the supply chain. Commenting on Amazon’s service, Ben Taylor, CEO at Rainbird, suggests: ‘With Amazon Dash a whole chunk of that supply chain is disintermediated. You can see it coming when you look at the ways the devices are taking out whole chunks of people who are not part of the process of getting things to your door.’

Paul Clarke of Ocado, which sells its own FMCG products and those of the biggest incumbents such as Unilever, says he expects the company's predictive analytics to do the vast majority of a customer's shop.

**“There will be smart assistants talking to each other, organising your life and in many cases providing better info about your likes and dislikes.** We want to get to the point where our predictive analytics around our customers can do at least 80-90% of your shop. It wouldn't know that your dinner party guests were vegans but if it starts sharing information through Google Now maybe it could because you have had them round before. Analytics to do with predicting what customers want and recommendations letting them shop faster with lower friction. We want to make it easier but also encourage them to try new things.”

**Paul Clarke**  
*Chief Technology Officer*  
Ocado

## Trading of Goods and Services Processes

Furthermore, AI is likely to disrupt the trading of goods and services among businesses as well as between businesses and consumers. Mike Lynch expects procurement to become automated and more efficient as computers seek out the best prices and draw up contracts.

**“We will see automatic contract negotiations. The whole process of buying and selling will become automatic and margins will be reduced by price discovery. Contract negotiation will be in a world where optimisation of a transaction happens in real time. The concept of a steady price won't exist because there is no reason for it.** As a result, company profit margins will become very tight as people compete to supply things. We talk about a much more efficient price discovery that is much more real time.”

**Mike Lynch**  
*Founder*  
Invoke Capital

Overall, new AI technologies are creating new trends and processes, changing traditional models about how decisions are made within the corporate world.

“For big organisations we have got systems that understand that organisation and can get a live view of what is going on. The most advanced AI is bringing modelling to that. Not only are you understanding what is happening but you can ask: ‘What if?’ **With access to the right data if you are a purchaser or a supplier you can make very nice predictions about what should be produced. You can optimise factories and improve efficiencies within factories with these models, which is very useful. When you’ve got enough data you can do things like agent-based modelling where you can have a virtual company that is a mirror of the real one with the same people, departments and processes.** From that you can ask questions like what if I cut out that department or ran that promotional campaign?”

**Peter Bentley**  
*Chief Technology Officer*  
*Braintree*

Peter Bentley and Braintree’s Chief Executive, Nikolay Gurianov, say they have helped a sports retailer with its own brands optimise factory production to produce the goods that sell regardless of the weather or the season, helping factories tackle what they say is the NP hard problem<sup>3</sup> of optimising factory production. AI is also helping companies model and test production plans to maximise efficiency.

Paul Clarke of Ocado argues that at the other end of the supply chain AI has the potential to make deliveries more efficient – not only by better coordinating individual companies’ operations but encouraging companies to work together.

Professor Michael Wooldridge notes the software provided by Combinenet of the

US already allows companies to automate procurement and that such technology will become widely used.

“Deliveries to homes and businesses are very uncoordinated and use scarce resources. Everybody has their own supply chains but if you could find ways for people to share information maybe through us or intermediaries. It seems unlikely to think - looking across the supply chain - you couldn’t get better.”

**Paul Clarke**  
*Chief Technology Officer*  
*Ocado*

“If you are a large company you can already specify in quite rich terms exactly what you’re after. Computer programs can find that very efficiently. You can describe what you’re after to find the best option at the best price. That technology is there at the moment. The people who are using it are very large companies with very expensive procurement tasks ahead of them and it is working right now. **It will be some time before the technology filters down to the consumer level and to smaller companies but you will see the spread of these techniques. They will get cheaper and more-easy to use and will make their way into larger and larger communities.**”

**Michael Wooldridge**  
*Professor*  
*University of Oxford*

Also, AI is disrupting our current labour models both for blue collar jobs and white collar jobs. In fact, Ginni Rometty, President and CEO of IBM, argues that the jobs of the future won’t be blue or white collar. They will be a ‘new collar’ in which employees will work with AI systems in completely new ways.

<sup>3</sup> The classic NP hard problem is the travelling salesman problem: Given a list of cities and the distances between each pair of cities, what is the shortest possible route that visits each city exactly once and returns to the origin city?

In past waves of automation and technological advancement, manual work such as factory production and tradespeople have been most affected, while knowledge-based sectors such as law and consulting have been unaffected or have even benefited as knowledge became increasingly important. Things could be different in the age of AI, however, as computer brain power harnesses rich data sources to carry out tasks previously performed by highly paid humans. The case for this scenario was set out forcefully by Professor Richard Susskind and Dr Daniel Susskind in 2015.<sup>4</sup> They argued that technology would strip away the protected status of the professions as computers match and then surpass the ability of human doctors, consultants and lawyers to solve problems for large fees.

“The question for the future is not ‘what is the future of the professions,’ but **can we find other ways of producing and distributing practical expertise in society**. That is how the economist would phrase the challenge. The minute you start looking at the world in that way you realize that much of work the professions do and have started to do will not need to be done in the future.”

**Richard Susskind**  
*OBE, IT Adviser to the Lord Chief Justice, pioneer in AI and law*



Knowledge-based services such as law, accountancy and consulting are businesses Britain excels at. One of the reasons the City of London has held on to its status as a global financial centre is because of the support network of international law firms, consultants and other professions based in London.

So far, professionals have mainly used AI to make their own jobs easier. For example, lawyers now deploy AI to search for potential legal problems in data rooms when their clients are negotiating an acquisition and to sift through thousands of documents and emails disclosed by their opponents during litigation.

The Big Four accountancy firms are all working on AI projects to provide services to corporate clients across their audit, consulting and advisory businesses. These new types of services have radical implications for their business models during the timeframe of this report. Services will be made available through chatbots or other agents and will be available constantly. Firms' AI could be in a constant state of dialogue with equivalent systems at their clients to enable audit and other activities to take place in real time.capi

Shamus Rae agrees with Susskind that profit margins for professional services firms have been in decline for a decade. Rae says this kind of service will be available through phones and computers but that the main contact point will be an Amazon

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<sup>4</sup> The Future of Professions 2016

Echo-type device that sits in the middle of the boardroom and in senior executives' offices.

Shamus Rae, Head of Innovation and Investments - KPMG



• **“The model where you sell people by the hour for audit and advice has gone. The model has to change.** All professional services firms are looking at data in a new way. Data and low level IP are being collected. At the moment that needs to be trained into people’s heads over a number of years. Not just why A goes to B but why you did it. You will be able to talk to a device and say: ‘I want to buy a fintech company in the UK for a certain price’ and you will get a shortlist of companies you might want to look at. You will be able to get advice on supply chains, tax changes or if you want to buy a company. **If you want to search for a company or do some basic due diligence it will take six to eight minutes rather than six to eight weeks.** Clients will still want a relationship and an expert point of view because of the emotional connection but that is more **about having trust in the system.**”

Rob McCargow, Programme Leader Artificial Intelligence - PwC



• “Corporate reporting could be significantly transformed; instead of providing stakeholders with written content, we could utilise virtual reality to immerse them in the organisation’s assets and enable them to interact with avatars in the field. This would dramatically bolster stakeholder trust.  
• **We will see a significant evolution within the audit itself. Rather than providing an opinion on a sample of accounts at financial year end, we could conceive of a future where the entirety of the organisation’s accounts are audited constantly throughout the year in real time.**”

The inevitable consequence of this shift is that professional services firms will charge clients in a different way. Rob McCargow at PwC says firms will move from charging for their people’s time to charging on a managed service basis for most work. Humans will still be involved but further up the value chain providing advice that computers can’t, such as critical reasoning and counterintuitive advice and skills. The services offered to clients will also change radically, he argues.

Harvey Lewis, Research Director at Deloitte, argues humans will continue to work alongside intelligent agents that acquire knowledge through machine learning and reinforcement learning, but that firms’ services will be “faster, better and cheaper” and investment will shift from capital expenditure to operational expenditure as firms use more data. Instead of being “called in” when a company enters administration, AI will enable professional services firms to spot warning signs and use various data points to alert clients that they are heading for difficulty. Another result will be opening up of the big firms to smaller companies because the automated advice will be cheaper, he argues.

Big law firms are not as far down the road in their thinking as the accountancy practices but are coming round to the need to keep up with their clients’ expectations.

Jonathan Brayne at Allen & Overy says adoption of AI is at an early stage for law firms because lawyers believe their advice is nuanced and therefore hard to automate. A&O has a range of digital services through its aosphere affiliate, allowing clients to find out about rules on matters such as the selling of fund products and international shareholding disclosure. He sees these services as complementing what the firm's lawyers do rather than replacing them.



“The dream is you will create a technology that will eliminate the need for lawyers but certainly **by 2025 that isn't going to happen. What is happening is we will use technology to support what lawyers do.**

We will eliminate some of the grunt work we do and free us up to apply high end lawyering.”

**Jonathan Brayne**  
*Innovation Partner*  
*Allen & Overy*

One of Mike Lynch's investments is in Luminance, a Cambridge-based start-up that he says has an edge over other AI that reads legal documents. Luminance has signed up Slaughter and May, one of A&O's "magic circle" UK rivals. Lynch agrees with Brayne that labour-intensive work will be automated but he argues Luminance will keep developing to take over the work done by many corporate lawyers.

**“A lot of what law firms do is a lot of grunt work that will be removed.** There will be no margin in that work. Going through M&A due diligence, the actual act of going through it that racks up a lot of hours, won't cost very much. **In contract negotiation, at the moment for no good reason contracts are quite bespoke documents but they will become quite automated.** You can break the cartel. Law firms muck about a lot. As soon as you make that a machine that doesn't last very long. They will be shifting to new areas. How do you make sure everything going on is compliant? That's the sort of higher value work a law firm will do as a business.”

**Mike Lynch**  
*Founder, Invoke Capital*

## Blockchain

If chatbots and Alexa are the AI that will connect businesses with customers to sell services, blockchain is the means for recording transactions to create trust in trade through AI.

Blockchain is a software platform for digital transactions that provides a permanent, secure and transparent ledger for exchanges of digital goods. Until blockchain was introduced, society used a “middle-man” (i.e. a bank) to make a transaction, but, through blockchain, consumers and suppliers can now connect directly, without a third party. Blockchain, however, has transcended its original role as an enabler of



transactions involving bitcoin, the crypto currency, and is now used by banks and other companies for recording transactions.

Although the blockchain ledger is not AI, it could be the enabler that allows AI to flourish because it provides a trusted record of transactions that is decentralised and cannot be manipulated. Ultimately, blockchain relies on a chain of computers to verify and record an exchange before it is approved. It has the potential of being used by anyone with internet access and, in theory, can be applied to any transaction involving value.

PwC has described it as the necessary complement of AI<sup>5</sup> allowing stakeholders to verify, execute and record transactions based on AI's assessments and decisions. PwC's Rob McCargow thinks blockchain could be the trusted platform to underpin his firm's AI eventually working constantly with a client's AI to provide real-time audit and other services.

In the energy sector, blockchain could open up the market to innovations such as peer-to-peer energy trading. David Ferguson of EDF Energy says his company is keeping a close eye on the potential for consumers to trade energy, ultimately cutting out the energy companies if they do not adapt. Households with solar panels in particular would be able to sell their energy to a neighbour when they are out and then buy some back later. The Brooklyn Microgrid in New York is already doing something like this on a local basis and Ferguson sees blockchain as the technology that creates the assurance for it to work on a larger scale.

**“As I export a unit of energy a token would be created and put on the blockchain to say I've exported one unit at this time.** That token will be shared with everyone else in the network. It would be trusted because it would go to a secured repository that couldn't be hacked or corrupted. If you've got a network of thousands of people each with thousands of transactions it's a very effective way of managing those transactions in a trusted way.”

**David Ferguson**  
*Head of Digital Innovation*  
EDF Energy

*The big prize for blockchain could be in the unlocking of trade itself by speeding up and reducing the cost of trade finance.* This has positive implications not just for individual companies but for the global economy.

Global trade, as a percentage of GDP, fell last year for the first time in 15 years -raising concerns about the prospects for economic growth, traditionally led by trade.<sup>6</sup>

With the UK embarking on Brexit and seeking to increase exports to rebalance the economy, British SMEs could benefit from easier, cheaper and less risky channels to sell their goods abroad. The World Trade Organization has identified greater access to trade finance as one of the most important measures needed for SMEs to trade in international markets.<sup>7</sup>

<sup>5</sup> [The yin and yang of AI and blockchain](#), September 2016

<sup>6</sup> Trade in 2016 to grow at slowest pace since the financial crisis, World Trade Organization September 2016

<sup>7</sup> Trade in 2016 to grow at slowest pace since the financial crisis, World Trade Organization September 2016

Commercial banks are working on their own or in groups on blockchain-based technologies that could revolutionise what is still a cumbersome, paper-based process for financing international trade.

In August 2016, HSBC and Bank of America said they had emulated a letter of credit transaction using blockchain. The next month, Barclays said it had worked with Wave, an Israeli start-up, to carry out the first blockchain-based trade finance transaction in the real world. Standard Chartered and DBS of Singapore are also working on blockchain-based processes to simplify trade finance.

Letters of credit guarantee more than \$2 trillion of transactions, reducing risk between importers and exporters, but the process creates an extended paper trail and is time consuming.

By putting the transaction on a distributed ledger, the importer and its bank, together with the exporter and its own bank, can see the data in real time, providing assurance that a payment will be met and cutting down on admin and costs.

HSBC's Vivek Ramachandran argues, if the banks are successful in developing the technology, the end result will be increased trade as companies feel secure in buying and selling across borders, and costs fall.

**“The reason there is a lot of excitement about blockchain and the distributed ledger is because it lends itself to the problems faced in trade for multiple counterparties to share information in a robust way.** It has served as an impetus for banks to collaborate. **The real push from a UK perspective is that the UK is a large trading nation with a large reliance on exports and imports so the UK adopting a digital solution will be a big step forward.** One solution or a set of solutions that are interoperable would be a big step forward. The UK is one of our home markets and is a big trading nation so from that perspective it is very important to us. It's coming from the buyers and the sellers. The end game is more trade by making it cheaper, quicker and more efficient for companies to buy and sell cross border. Our role is to facilitate trade and the impetus is coming from clients who want to get rid of paper to make it less cumbersome. The main upside is going to be our clients trading more.”

**Vivek Ramachandran**  
*Global Head of Product and Propositions*  
*HSBC's Trade and Receivables Finance business*

## Blockchain – The Barclays Experience

Barclays plc has been at the forefront of the work on digitisation, automation and blockchain and what it would mean to the industry. Michael Harte, Head of Group Innovation, and Eser Torun, Director of Investment, discuss how the digitisation process and new technologies like blockchain will impact the industry and the future.

**“It used to take 10 days and seven or eight players to put together a transaction. Now it takes 10 minutes but that isn’t really AI; that’s digitized automation.** You can combine that with algorithms running around optioning shipping space.”



– Michael Harte, Head of Group Innovation at Barclays

**“I am a big believer that everything can be digitized – and money is no exception.** Blockchain is a shared database that everyone on the chain can see what is there. Once you make the record you can’t delete it. You can put a reversing record to correct it but not delete it... It is transparent. Details of transparency have to be identified. Barclays has been working on that technology, in the industries of systems like R3. It is helping to identify what blockchain will mean for the industry.

**Barclays having its own blockchain means nothing unless everybody on the value chain adapts it. That is revolutionary. It will define the future of banking.** I don’t think blockchain or cryptocurrency are the only factors that will make banks redundant or, basically, define the future of banking. There are so many other technologies like artificial intelligence and the cloud.

But, banking experiences in the future will be optimally designed around these new technologies, integrated to our lives.

While we talk about future in banking, I encourage us to think about all the different forces in play -not just one concept, whether it is money or Blockchain, but everything together. Because in the future you won’t apply for a mortgage after buying a house. Mortgage will be integrated into your buying journey.

Value creators of the future are the ones who will figure out how value creation can be embedded into the world around us without friction. In Barclays, we are in that value creation journey but we can’t do it alone. We need partners who can and will work with us in that value creation journey.”



– Eser Torun, Director of Investment Banking at Barclays

The benefits of blockchain can be linked to AI opportunities. Blockchain and AI both rely on data sharing. Blockchain results in not only *more* data but also *qualitative* new data. This data can be used to build better models and sets the foundation for platforms of shared control of data. Also, blockchain helps produce an audit trail which helps AI technologies create a sense of trust. Lastly, blockchain leads to decentralized data and model exchanges as data is treated as intellectual property assets.

Likewise, AI can also help blockchain flourish, mainly through its ability to make sense of data. In consequence, data sharing will result in much more data which stakeholders can use to produce better models, higher profits, and lower costs. In other words, blockchain and AI can be used together to help resolve market inefficiencies.

Blockchain's potential shows how the benefits of AI will not necessarily accrue to big businesses only. An outcome from AI's impact on trade that crops up throughout this report is the potential to democratise business by opening up supply chains and services to smaller firms and consumers.

The large accountants have described how moving to a managed service model using intelligent agents could make their services available to entrepreneurs and SMEs that cannot afford to hire a highly paid consultant by the hour. EDF Energy, Britain's second-biggest energy provider, is considering how to respond to the prospect of consumers bypassing it to trade energy through the blockchain ledger. Blockchain also promises to make it less risky and cheaper for SMEs – the lifeblood of the UK economy – to sell their goods and services overseas. Paul Clarke at Ocado says AI has the potential to empower makers and small producers of food products by giving them greater access to markets. Platforms are available for small businesses to adopt AI that would have been out of reach only a few years ago. Transparency and the removal of long-established barriers to entry should be positive news for smaller operators in markets.

Overall, the combination of innovative technologies and developments creates a new era of AI commerce. And, in consequence, this era of AI commerce is completely reshaping market institutions.

**To make it smart you need efficient systems and machine learning too.** “Ocado runs on AI, big data, the Internet of Things and robotics. It's the interaction of these four things that is particularly powerful. Smart autonomous systems that are plugged into the world around them. That's true whether it's autonomous systems or the smart robotics we are putting into our warehouses or what we are doing on the consumer side. AI would be top of my list. A robot without AI is at best a stupid repetitive machine. To make it smart you need efficient systems and machine learning too. It's completely pervasive across the whole platform.”

**Paul Clarke**  
Chief Technology Officer  
Ocado

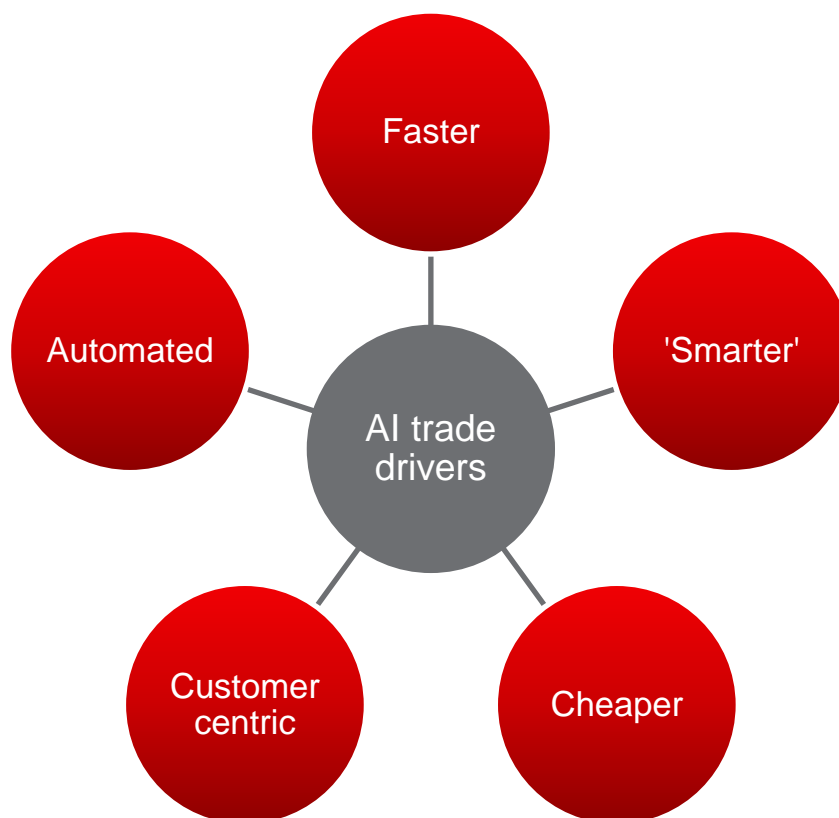
## 4. Faster, smarter, cheaper: bespoke and automated trade solutions

A key question in unpacking the AI impacts is: What is driving the AI revolution and its applicability to trade?

The simple answer is, as in all aspects of AI, technology itself. After decades of stop-start progress, the conditions for exponential technological growth have been put in place by a surge in computer power and the generation of big data from the internet resulting in progress in machine learning and algorithms.<sup>8</sup> Developments that seemed outlandish a year or two ago are now taking place very quickly. Technology that has existed for many years is being super-powered to reach its potential.

As with any new technology, businesses and individuals embrace and invest in AI to ensure their lives are made easier, to create efficiencies and to keep up with the capacity of their competitors as well as the expectations of their customers.

**Figure 5. Five AI drivers in trade**



*There are underlying economic and business pressures at play. Just as the digital revolution has helped enable the development of AI by generating the data that fuels the machines, it has also made the world more complex through a surfeit of information*

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<sup>8</sup> Obama report December 2016

and the creation of options that weren't available in the analogue world of the early 90s.

Peter Bentley says AI is “the solution to the future” – a necessary outcome and antidote to the data boom created by the internet.

**Having AI is the solution to information overload. It is the solution to this problem we are bringing on to our own heads whether we are a business, working for ourselves or just trying to live our lives by distilling information and giving us the important stuff.**

“Let's say the internet was a revolution in democratising information and allowed everybody to get access to information. Combined with the revolution of computers for everybody and all sorts of other things. These are amazing things but they have a downside: too much data. We used to call it data overload. The managers of big organisations see this first but we now see this happening to everybody and it's not getting any better. There is more choice of entertainment and there are thousands of websites and apps. Having AI is the solution to information overload. It is the solution to this problem we are bringing on to our own heads whether we are a business, working for ourselves or just trying to live our lives by distilling information and giving us the important stuff. That is the point of AI. It's absolutely essential and inevitable because of the way the world is moving. What else are we going to do?”

**Peter Bentley**  
Chief Technology Officer at Braintree

**There are many applications of AI in areas like logistics that can make commerce much more efficient because it can organise supply chains much more efficiently.**

“AI techniques can personalise things for consumers. What it can do for businesses is help them find the services and products that they want much more efficiently. In that sense it oils the wheels of trade. It can make trade more efficient by providing people with much better matches to what they might be after. There are many applications of AI in areas like logistics that can make commerce much more efficient because it can organise supply chains much more efficiently. Where the big successes are in AI are those narrow, well-defined technologies where machine learning can be applied to those narrow tasks. General purpose AI systems are somewhere way off. But every time you make a decision, having a program that has helped you make that decision more efficiently is a bonus.”

**Michael Wooldridge**  
Professor at University of Oxford

Professor Michael Wooldridge sees AI as an enabler of trade by making transactions easier and more efficient – a recurring theme in this report.

The generation of vast amounts of data by the internet has coincided with globalisation and the integration of fast-developing economies into international trade. The potential for exponential growth coincides with the aftermath of the financial crisis, which has left a legacy of suppressed economic growth (at least compared with the years leading up to the crisis),<sup>9</sup> prompting companies to seek out new sources of revenue and reduce costs.

<sup>9</sup> The International Monetary Fund [upgraded its forecast for global growth in April 2017](#) but maintained its previously stated view [that the recovery was precarious and the longer term trend for the world economy remained muted](#).



There are also new powerful competitors for established businesses from large data-rich businesses such as Google, Amazon and Alibaba.

Michael Vrontamitis, Global Head of Trade, Product Management at Standard Chartered, says companies face the constant challenge of increasing profits in a period of muted growth, prompting management to seek greater efficiencies. Manufacturers are seeking to respond more quickly to rapidly changing customer demands with talk of restoring some manufacturing to developed markets such as the US leveraging robotics and delivering products by drone or through 3-D printing. The banks that these companies rely on to finance international trade are also under pressure from more onerous capital and compliance rules that make these transactions more expensive. AI, he says, holds one of the keys to overcoming these challenges.

**They want lawyers coming up with things that are better and cheaper**

“Clients are driving this much more than they used to be. Some banks are sophisticated and understand what can be achieved and are using some of these products. Some people are less sophisticated but they want lawyers coming up with things that are better and cheaper.”

**Charles Kerrigan**

Partner and Head of International Finance Practice Group  
CMS



**We have got this transformative business model because of technology.**

“There is a low-growth environment and a low inflationary environment and at the same time we have got this transformative business model because of technology. When I talk to clients in the corporate world everyone is under huge pressure to reduce cost and to reduce the price of goods that are ultimately sold. You will see a more disparate supply chain broken down into smaller and smaller pieces, which makes data more important in the supply chain. Then you can imagine a world where you manufacture your own materials at home you are receiving the IP from the company directly and printing their product on your 3D printer. These things are happening and its great but you still have the reality in trade finance where you deal with a lot of paper. So how do you leverage your data more effectively?”

**Michael Vrontamitis**

*Global Head of Trade and Product Management  
Standard Chartered*

Big law firms are responding to the resulting pressure from their corporate clients to do things better and cheaper. The legal world, which is usually slower than other sectors to adopt new technologies, has embraced AI for labour-intensive tasks such as trawling through documents as international law firms have been deluged by an eruption of digital paperwork created by digitisation and the sheer number of additional laws as globalisation draws more countries into the world economy.

**The volume of law is exploding too for a number of reasons. A lot of countries have entered the global economy in the past 20 years that weren't really part of it before, like India, China and many countries in Africa.**

“In this digital world the volume of documents and data has exploded. Given most law firms and lawyers deal in documents that presents a challenge. The volume of law is exploding too for a number of reasons. A lot of countries have entered the global economy in the past 20 years that weren't really part of it before, like India, China and many countries in Africa. We're now dealing with law not just in the developed world but in high growth emerging markets, which are producing laws at a rate that is alarming. That makes technology potentially the only way you can get your arms around those two problems.”

**Jonathan Brayne**  
Innovation Partner  
Allen & Overy

Across the economy, AI promises to disrupt and enhance the way companies trade goods and services – with each other and with consumers. From fast-moving consumer goods to professional services, AI is likely to alter business models, drive down prices and commoditise services.

In financial services, retail banking and insurance have gone digital but trade finance remains a largely paper-based world.



“When we think about digitizing trade finance, **the real issue is digitizing trade and in that journey we are at an early stage as an industry.** Documentation, especially in the trade world, isn't standardized. Invoices and shipping documentation never look the same. I hope that through a process of digitization we will standardise the data. Our role is to facilitate trade and the impetus is being led by the clients who want to get rid of the paper to make trade less cumbersome.”

**Vivek Ramachandran**  
*Global Head of Product and Propositions*  
*HSBC's Trade and Receivables Finance business*

## 5. Defining the competitive edge in AI

Competition structures in trade have always changed with technology and the AI revolution faces the same disruption. The most fundamental source of competition will be the control of data and, interestingly, the least competitive factor will be the actual products and services. In fact, many products and/or services are or will be given out for free. The profit is and will continue to be extracted from alternative sources.

To fulfil the promise of AI to transform trade, companies need still more data – much of it from outside sources. One of the main recommendations made by the Royal Society was for the government to ensure as much public sector data as possible is available to fuel further waves of development in machine learning.

Paul Clarke of Ocado says information owned by digital companies such as Google, Facebook and TripAdvisor holds the key to creating and supplying products customers seek. He says companies need to share data to strategically capitalise on opportunities and, consequently, make trading processes run more efficiently.

“Smart stuff is not just about natural learning processing but about how machine learning attempts to get into the head of consumers.

**We want to get to the point where our predictive analytics around our customers can do at least 80-90% of your shop.** It wouldn't know that your dinner party guests were vegans but if it starts sharing information through Google Now maybe it could because you have had them round before. Without that data there is no AI. It is the fundamental future of machine learning.”

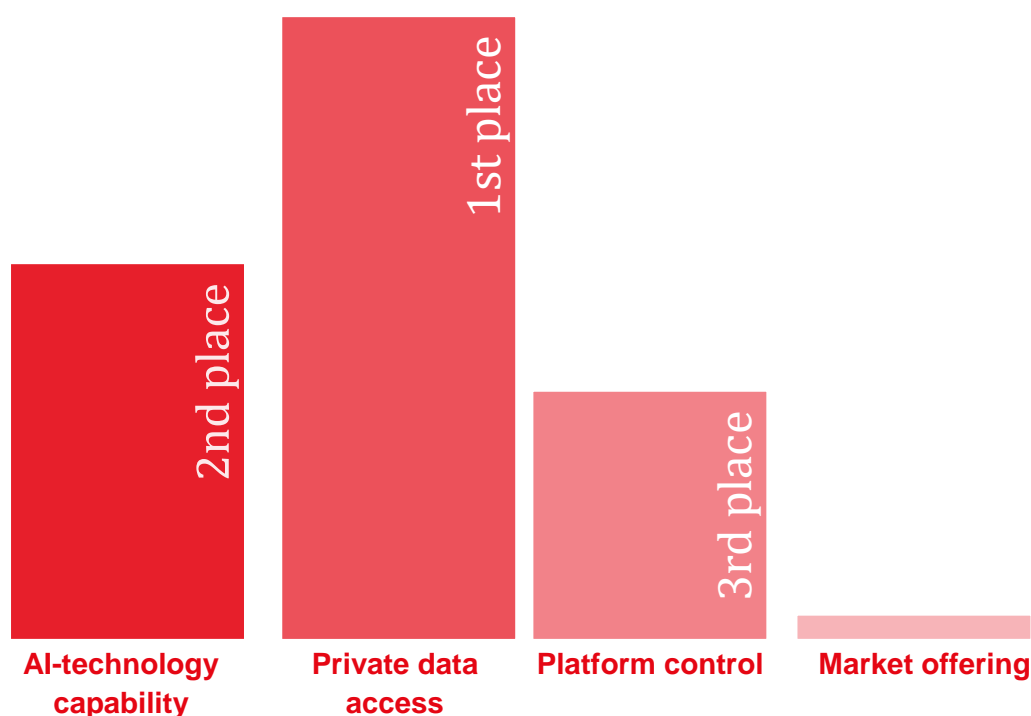


**Paul Clarke**  
*Chief Technology Officer*  
*Ocado*

Artificial intelligence depends on data and hence it is a necessary ingredient to survive in an increasingly AI-filled world. Thus, the competitiveness of a business largely relies on its data ownership. Other variables that are important are: (1) technological capability and IP ownership, (2) AI platform ownership, and (3) market offering – the AI products and services offered. Given that there is a relatively small talent pool of qualified technological experts currently, technological capability is quite important. However, as generations are retrained with new skills, it is expected that technological capability in terms of actual human talent will not be as competitive.

Figure 6. Competition factors in AI markets

## And the winner is ...



The banks' efforts to develop digital and AI approaches to trade finance shed light on a wider question for fulfilling AI's potential to transform trade in goods and services: ownership and pooling of resources.

Who owns the data required to fuel the next round of innovation? Which platforms will become the "new Google" to dominate transactions in the way that Alphabet's engine has captured internet search? How will companies accustomed to guarding their innovations and information be persuaded to combine forces for the wider good?

The importance of data ownership is highlighted by the potential competition established operators could face from players such as Apple, Google and Alibaba looking for new ways to deploy their information. The trading of energy<sup>10</sup> and trade finance,<sup>11</sup> two of the areas covered in our report, could both face disruption from such competitors, helping to drive the push for automation and adoption of AI.

<sup>10</sup> [Reimagining Commodity Trading](#), Oliver Wyman 2016

<sup>11</sup> [The Digital Revolution in Trade Finance](#), The Boston Consulting Group 2016

“On a typical English day there will be sunshine and cloud and there will be times I produce a lot of energy and times when I don’t. When I’m out I can export my energy to charge your battery. The result is consumers get cheaper energy and it puts less demand on the network because electricity isn’t travelling as far. **It’s potentially very disruptive because there is no energy supplier.** This could happen quite quickly. If we do nothing, we get cut out of the whole setup and we are beginning to explore what we would do in that kind of situation. There is some kind of service we can offer. If other companies are going to come and do it then why not us?”

**David Ferguson**  
*Head of Digital Innovation*  
*EDF Energy*

A sector with the potential for radical disintermediation is energy consumption. David Ferguson says EDF Energy is keeping a close eye on the prospects for peer-to-peer (P2P) trading of energy by consumers with solar panels. Ferguson says New York’s Brooklyn Microgrid<sup>12</sup> could be made to work on a larger scale – possibly fairly soon. There would be benefits in optimising the way the UK energy grid works but with the potential to cut companies like EDF Energy out of the chain. Solutions for EDF Energy include building its own P2P energy platform on the basis

that it is better to embrace change than to ignore it.

Peter Bentley of Braintree argues if companies corner certain AI markets this will undermine the liberating potential of AI by making the world more difficult to navigate rather than less so.

Individual banks or small groups of banks are working on their own platforms for trade finance, but they acknowledge the value of a shared platform, or ones that communicate with each other. Vivek Ramachandran says competition has helped to drive innovation but, ultimately, banks need to compete on the services they offer their clients, not on rival platforms.

“I think experiments are important. It’s important that banks develop intellectual capital. **We don’t want to develop a proprietary platform. It has to be shared and distributed.** There needs to be competition between banks.”

**Vivek Ramachandran**  
*Global Head of Product and Propositions*  
*HSBC’s Trade and Receivables Finance business*

**“AI shouldn’t be owned by a single company or a single product. If we’ve got any sense it should be like the Internet so that everybody has the right to do their own AI. Hardware should be able to support this.** This vision is one of necessity because if we don’t make it a universal thing it will just get more complex.”

**Peter Bentley**  
*Chief Technology Officer*  
*Braintree*

In knowledge services, the big accountancy firms acknowledge that FTSE 100 chief executives will not want multiple devices sitting on

<sup>12</sup> [A startup in Brooklyn will let people collect and trade solar power, bypassing utility companies](#), Fortune March 2017

**“At the moment everybody is doing their own thing. There isn’t a lot of coordination, particularly between parties that might see themselves as completely disconnected but with smart data we might be able to work out ways to create competitive ventures or services**

between different parties and by having better intelligence about what people consume and when you can produce things just in time but also get them to people just in time.”

“There is a lot of data people are going to provide for free but may not be configurable or you share with some people whether as a retailer or consumer it can be made available. How you standardise so the data can be aggregated and interact with one another is key. Without it you won’t be able to build up the machine on top. We need the data right if we want to get the AI to follow.”

**Paul Clarke**  
*Chief Technology Officer*  
*Ocado*

their desks offering different services. Alexa and its Echo hardware, which Amazon is encouraging third parties to use, might well be the means for firms to offer their services.

Paul Clarke at Ocado says there is minimal cooperation along the FMCG supply chain; however, he says it is in all parties’ interests to work together to share valuable data, cut out waste and create the products people want.

Artificial intelligence platforms also play a huge role in a company’s competitiveness. As AI technologies are becoming

more and more advanced, there is a high demand for platforms to be created. These platforms, as Shamus Rae from KPMG points out, have to be open and accessible across the ecosystem.

Professor Michael Wooldridge points out that there are readily available platforms that companies can build AI onto and says that, though big companies with proprietary data have an advantage, it’s possible to accumulate the data you need even if you are a smaller player.

**“One organisation is going to build that platform and have open API.** Whether it’s KPMG or IBM you will have to create an open API so the competition can use it because if you’re a chief executive you don’t want to have 40 different devices.”

**Shamus Rae**  
*Head of Innovation and Investments*  
*KPMG*

“There are a number of platforms that are if not open source then available. **Companies that have access to a large data source have the advantage here.** Those companies keep detailed

records of consumers and customers. Tesco will have huge data sets available to it. Google and Facebook and all these people have large data stores. That is a big asset and there are limited examples of these information sources being made publicly available because people aren’t going to share them if they think it gives them a competitive advantage. Those that have the data will be able to do it more efficiently.”

**Michael Wooldridge**  
*Professor*  
*University of Oxford*

*The picture portrayed by this report mirrors the wider literature on AI: by 2025 AI has the potential to radically alter the way goods and services are traded by making transactions more efficient, cheaper and targeted.*

Britain has the potential to play a leading role in the coming revolution. Early contributors to the APPG on AI stressed the UK's vibrant start-up scene and the presence of Google DeepMind in London as evidence that the UK is a magnet for AI innovators. The government has backed AI by making it one of the industries featured in its industrial strategy and providing £93m of funding over the next four years.

Yet Britain faces competition from the US - with its massive pools of research funding and leading AI hub in Silicon Valley. China and other countries are also seeking to reap the rewards of AI's growth potential. A concerted effort from government, regulators and business is required for AI to fulfil its potential.

The Royal Academy's report on machine learning makes several observations and recommendations about Britain's prospects. It notes that, despite the attention given to AI in recent years, adoption was patchy among Britain's businesses. This conclusion is underlined by the results of a report by PwC in January 2017 estimating only half of UK chief executives address the impact of AI or automation on their organisation, lagging significantly behind companies in Germany, China and the US.<sup>13</sup>

Rob McCargow at PwC says his firm's survey casts doubt on the ability of some corporate clients to make full use of the significant benefits to be accrued from the AI revolution.

"We may one day see a client's AI interacting and collaborating with PwC's AI in order to undertake the heavy-lifting of an audit. In such a highly-regulated relationship - and with significant challenges to overcome with regards to algorithmic transparency - **it is likely that expert human oversight will be required for the foreseeable future.**"

**Rob McCargow**

*Programme Leader – Artificial Intelligence  
PwC*

AI depends on data. Hence, the Royal Society called on the government to make as much public sector and research data available as possible to make AI possible. It noted that companies in the private sector held much useful data and that there was a tension between the common benefit of sharing such information and companies' natural desire to use it for competitive advantage. It pointed out that not all useful data gives companies that advantage and urged companies to use platforms or marketplaces to share data.

<sup>13</sup> [UK businesses must embrace AI and automation or risk being left behind](#), PwC January 2017



"We need better coordination and consolidation of supply chains across more companies. How can you use technologies to help coordinate activities where in a sense people see themselves as competitors but they need win-win strategies in finding ways of working together? **There is a role for government to create infrastructure or incentives to get people to work together.** The government needs to say: there will be something in it for you because otherwise we will have to build more roads."

**Paul Clarke**  
Chief Technology Officer  
Ocado

Paul Clarke at Ocado argues it is essential for companies to share data and work together to create the efficiencies and benefits in terms of trade that AI promises for society. He says the government should create incentives for collaboration. He gives the example of deliveries, which could be made more efficient by companies working together.

Raj Sandhu at Bikal, whose products include real-time analytics based on machine learning, echoes these concerns about companies' preparedness, pointing out that businesses he works with still organise data for loyalty schemes, website sales and other activities in silos. This inhibits their ability to make use of the information to compete with Amazon, as the US data behemoth seeks to encroach on more aspects of UK trade.

Businesses need to have the technological capability and truly understand AI if they wish to compete adequately in the international arena. There is a lot of potential AI can offer; hence, businesses need to have the ability to take opportunity of it in order to reap its benefits.



"If I was a big retailer now I'd be scared to death about what Amazon are doing. There are new technologies but there is also a fear of failure. There are great opportunities for businesses but I'm not sure they are moving quickly enough. Data collection has been pretty good but the integration side of it hasn't been very good. You can API into Facebook and look at people's public profile but not enough companies are doing that. The data is there but it's not being utilised at the moment as it should be."

**Raj Sandhu**  
CEO  
Bikal Tech

**"There may also be new categories of goods and services. Understanding of AI will become goods to be traded."**

**Mike Lynch**  
Founder, Invoke Capital

## 6. Trade is transformed by 2025?

Many thought leaders, innovators and entrepreneurs believe society should anticipate significant developments in artificial intelligence in the envisaged 2025 timeframe, particularly within the category of narrow AI applications. These predictions do not rule out transformations to trade arrangements and traditional trade models.

Experts in their markets such as Mike Lynch and Vivek Ramachandran say 2025 is a reasonable target date for trade to have been radically transformed by AI.

**We are likely to see the cost of technology become very low. It costs a tiny fraction, it doesn't get bored and can handle a very large throughput in a way a human can't.**

"AI has been a long time coming. The difference now is that in the last five years technology has got to the point where it can solve problems that were very difficult to solve before. It's a fundamental change. We are likely to see the cost of technology become very low. It costs a tiny fraction, it doesn't get bored and can handle a very large throughput in a way a human can't. It's likely to transform everything by 2025."

**Mike Lynch, Founder, Invoke Capital**

**"As exciting and fashionable as all this is, we have only got eight years for any future vision."**

"2025 is eight years away. In 2009 things weren't that much different from now. As exciting and fashionable as all this is, we have only got eight years for any future vision. We will be closer to the things we have talked about but I wouldn't be so bold as to say it will be finished and ready – though we are seeing the first signs with Amazon's Alexa, Apple's Siri and things like that."

**Peter Bentley, Chief Technology Officer  
Braintree**

**"If you are the large trading hubs such as the US, China and Dubai then trading with common standards and each of the systems working across each other that by 2025 should be achievable."**

"2025, whilst arbitrary, isn't a bad metric to have. A global set of standards is beyond 2025 but the UK trading with another big country by 2025 is likely. If you are the large trading hubs such as the US, China and Dubai then trading with common standards and each of the systems working across each other that by 2025 should be achievable."

**Vivek Ramachandran, Global Head of  
Product and Propositions  
HSBC's Trade and Receivables Finance  
business**

Others, like Ben Taylor, argue that 2025 is too tight a timeframe and it is unlikely that society will witness any dramatic changes during this time frame. The majority of individuals active in the AI sphere believe that changes will be visible throughout industries and sectors, but their volume and magnitude will vary between fields.

**“The technology at the moment is nowhere near the point where the media buzz about this would have it positioned”**

“In terms of what is going to happen over the next five or ten years there is growing recognition that current machine learning isn’t up to the task because it is not explainable and there is a push to build machines that can justify their actions. There is a growing realization about the opportunity afforded by automation but it will continue to be the case that progress is made in narrow applications. General intelligence is very interesting and utterly irrelevant. There are a lot of people trying to put dates on what might be achieved. The technology at the moment is nowhere near the point where the media buzz about this would have it positioned. A lot of people were expecting to be talking to a chatbot in a human type way by now but the technology isn’t there and won’t be for a long time but it is there in fairly narrow applications.”

**Ben Taylor, CEO, Rainbird**

## 7.Regulation and governance: making AI trade a reality

Based on an estimate provided by the Boston Consulting Group<sup>14</sup>, the applications created with personal data have the potential to generate as much as €1 trillion of value in Europe annually by 2020, with a third of the total flowing to private and public organisations, and two thirds accruing to consumers.

But for this value to be unlocked, consumers need to feel comfortable about sharing their personal information. Too many are extremely wary about abuse, turning away significantly from organisations they believe could misuse data and they are generally not swayed by monetary or social incentives to release their data. They need confidence and trust in the organisations that hold their data, in particular that the conflicts of interest, privacy and ethical issues will be addressed, and that proper redress is available when there are problems, transgressions or grievances.

This requires an increase in public awareness. Society needs to understand what AI is, how it is used, and how it will impact people in the short term and in the long term. People tend to fear AI because they are worried it will threaten human values and the quality of human interactions. As Professor Margaret Boden argues, people value the human experience and seek social interactions during business transactions.

“There are many people who actually **get annoyed and irritated when you are trying to find something out and there is nothing but recorded voices** or menus on the screen – no human contact. That can be really irritating even when it is not a situation in which you want something answered which appears to not be in the menu. You want a human being and you can’t get one. These [values] are very deep in us and a big part of human interactivity and human experience.”

**Margaret Boden**  
*Professor*  
*University of Sussex*



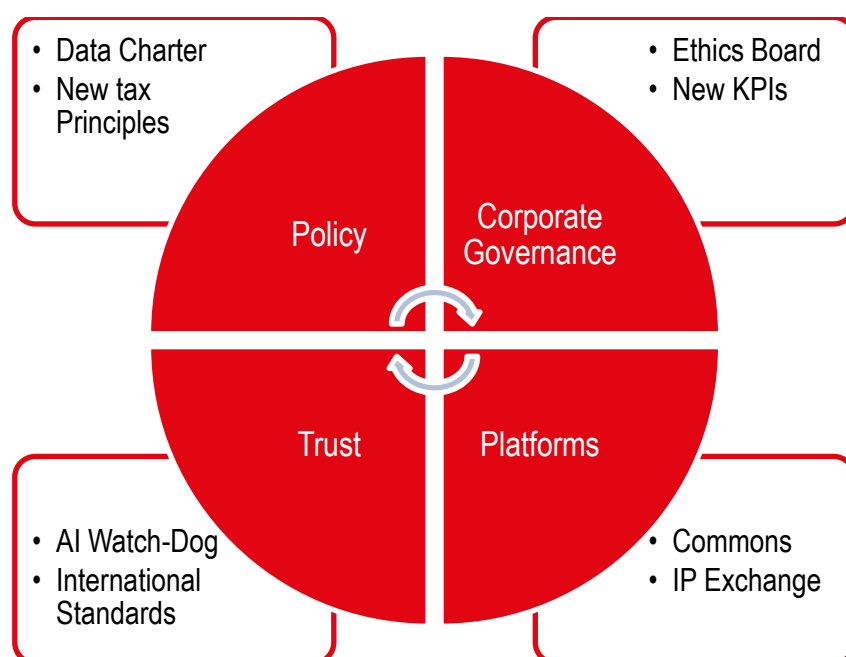
Regulations will also need to be overhauled to enable AI to fulfil its promise. For example, P2P energy trading will not happen while individuals are barred from trading energy, as is the case now. Accounting regulators in the UK and worldwide will also have to agree to new forms of audit and interaction between firms and clients for professional services firms to offer the kind of service talked about.

<sup>14</sup> John Rose, Olaf Rehse, and Bjorn Rober. The Value of Our Digital Economy. November 2012.  
[https://www.bcgperspectives.com/content/articles/digital\\_economy\\_consumer\\_insight\\_value\\_of\\_our\\_digital\\_identity/](https://www.bcgperspectives.com/content/articles/digital_economy_consumer_insight_value_of_our_digital_identity/)

In order to ensure the AI revolution benefits society broadly, a series of policies, regulations and frameworks need to be implemented. Transitions have to be made in four spheres: **policy, corporate governance, platforms, and trust**:

- AI should be governed strategically to open the doors to its full potential. In terms of policy, this report recognizes the need for a data charter governing the regulation around data use (as opposed to the core policy focus on data protection), as proposed by the Big Innovation Centre's Intangible Gold Project.
- In terms of corporate governance, it is suggested that companies appoint ethical boards to consider the moral dimensions of data use and the effect of emerging technologies. Companies should also rethink their key performance indicators (KPIs) of what good looks like, to make sure purposeful performances are rewarded and linked to the end results.
- To instil trust in these technologies, it is advised consumers and end-users unite around an AI watchdog to monitor the trading, and ensure benefits are spread fairly and risks are mitigated.
- Platforms need to be created that are standardized, easily accessible available to all citizens and stakeholders.

**Figure 7. Making the AI revolution real**



On an international level, to support such an AI ecosystem, specific institutions and standards need to flourish:

- IP Exchange platforms need to be established to encourage open innovation and cooperation among different global players.
- International standards have to be embedded within systems that protect human values and also assure economic efficiency when developing and launching AI projects.

- Stakeholders need to address implications for taxation and create legislation that confronts the exchange of intangible assets and intangible trade reporting to reduce the chance of further opportunities for tax avoidance on non-physical trade (building upon OECD’s recently introduced guidelines to tackle Base Erosion and Profit Shifting, BEPS). Furthermore, there has been a recent argument pushing for robots to pay income tax just as humans do. Bill Gates – one of the biggest advocates of this argument - suggests this type of tax can be redistributed in society to help reduce the potential negative impact AI can have on human employment.

These issues are discussed further below.

## Policy

Big Innovation Centre’s Intangible Gold Working Group argues that a “Data Charter on how personal and business data can be used” is a key step to unlock the next industrial revolution. UK policies enabling the trusted sharing of personal and business data are essential for new and innovative business models (digital entrepreneurship) to take off in the UK. It is also the only way for individuals to reach the benefits from Big Data, Internet of Things, AI and most other digitally enabled disruptive innovations. We need to make the smarter society a reality.

The greatest opportunities from ideas and ‘big data’ require links across organisational boundaries. The data and IP rights regime needs to be reframed to foster the open innovation and sharing revolution, encouraging citizens, companies, universities and government to open up to each other and to co-create new technologies and business models.

### A DATA CHARTER

#### *The Intangible Gold Working Group of Big Innovation Centre<sup>15</sup>*

We propose the creation of a data charter which builds on the presumption that data is owned by those who generate it. It will be a first mover for Europe. Although, it will be more liberal in nature (based upon user rights as opposed to merely protection), we should aim for it to actively connect with and feed into EU Data Protection legislation, to the best of our ability post-Brexit.

It should codify what can be done with personal and business data, so that everyone will know how their data is used, both to increase trust and create incentives to allow data to be shared. The charter will set out the principles for governance to ensure compliance, and the process for redress along with a schedule of fines and penalties for any abuse. It complements our proposals on company law and reporting, and aims to generate trust in the digital age. However the effectiveness of data use is that as far as possible data should represent the universe from which it is drawn, and there should be as few opt-outs as possible.

Thus the data charter should be enabling: the aim is to produce agreed trusted and robust protocols, along with agreed processes to address grievances and complaints. “Fair use” of personal and business data (if you are

<sup>15</sup> For details of the Data Charter, see “Policy Proposition Think Piece. Intangible Asset Reporting and an Intangible Assets Charter - Building Britain’s Intangible Infrastructure”, prepared by The Intangible Gold Working Group and published by Big Innovation Centre, April 2017. (The interim version of this report was discussed at the Intangible Gold Round table held at the Bank of England, 13 December 2016)

not competing with the owners of the data or harming their ability to monetise it) will create a free space to innovate by supporting entrepreneurship from the data revolution. This will unlock the UK's competitive edge in a growing digital and artificial intelligence enabled economy.

The charter will be mandatory for all and will contain a provision for individuals and companies to retain the right of opt out if they choose - an "Opted-In Unless You Opt Out" clause. In this vein, everyone is part of the digital data sharing economy from birth. The government is recommended to include it, along with our recommendations below, as part of an Intangible Assets Charter in order to raise the visibility of intangibles and the interconnectedness of the varying proposals.

**Recommendation: introduce a "Data Charter" on what can be done with personal and business data, including 'Fair Use' & an "Opt-In Unless You Opt-Out" approach to data disclosure:**

- **By introducing a 'Data Charter' on what can be done with personal and business data, everyone will know how their data is used, which in turn increases trust and creates incentives to allow data to be shared. This means a shift from policies around controlling the data itself to how the data is governed.**
- **The Data Charter should be used as reference for Ethics Boards in companies as well as consumer watchdogs dealing with data issues. As a first for Europe, the data charter should actively send proposals to Brussels to advance into EU Data Protection legislation and harmonization across borders.**
- **Such a Data Charter should also introduce "fair use" of personal and business data if you are not competing with the owners of the data or harming their ability to monetise it. This would create a truly free space to innovate by supporting entrepreneurship from the data revolution.**

The Data Charter should also adopt an "opt-in unless you opt-out" approach to personal and business data disclosure. Allowing citizens from birth to be born into a data sharing revolution (in which there is a Charter on how business can deploy private data) will empower each citizen. Just as there is no point in being the only one with a telephone or on Facebook, the opportunity from personal data can only be exploited when it is shared.

On a different note, the growth of the so-called intangible economy has opened up opportunities to erode the corporate tax base – base erosion and profits shifting (BEPS). Misallocation of profits on intangibles has been a major source of BEPS, and which the OECD addresses in its 2016 BEPS initiative. HMRG will have an important interest in wanting to see that intangible reporting will be consistent with BEPS principles and international conventions to ensure compliance – and reduce the chance of further opportunities for tax avoidance. This issue has become more relevant in the AI economy where tax havens are diminishing the multiplier effects of value generating companies.

### **OECD BEPS Initiative**

*OECD estimates that taxes not collected amount to between \$100bn and \$240bn each year – up to 10% of global tax revenue. If these figures are pro-rated for the UK (based on GDP share) between an estimated \$3.7bn and \$8.8bn each year of tax revenues are lost to the UK economy.*



*According to the OECD, “the losses arise from a variety of causes, including aggressive tax planning by some multinational enterprises (MNEs), the interaction of domestic tax rules, lack of transparency and coordination between tax administrations, limited country enforcement resources and harmful tax practices.”*

*Since the 2008 financial crisis and the impact on government revenues and borrowing there has been an increased focus on multinational firms and their moving of intangible assets between tax jurisdictions as a means of minimising tax payments.*

*Firms, even the very largest multinationals, have head offices and stock market listings which are within the jurisdiction of one or more sovereign states. When they trade in the some 200 independent countries and territories they must also obey the laws of each sovereign state. One of the key engagements between the firm and the sovereign states in which it resides and with which it trades is the payment of taxes. These taxes may include taxes on employment, taxes on sales, taxes on premises used (industrial, office and retail) and taxes on profits.*

*But as we have seen, the digital knowledge based economy is very different from the old economy. Digital economy firms have very high levels of intellectual capital, of which some percentage will be capitalised as intangible assets. These firms benefit from the increasing returns to scale and first mover advantages, and have, within a very small number of years, overtaken the largest firms in the old economy like automobile manufacturers and energy suppliers. Unlike tangible assets, intangible assets have neither mass, nor location; they are both weightless and stateless. This means that they can be transferred from one tax jurisdiction to another at the speed of the internet.*

*This fact is well understood by the OECD whose international perspective is uniquely qualified to provide insight in this area.*

## **Platforms**

But a set of data-sharing rules is not enough. Platforms need to be built.

AI integrated platforms for transaction of information, data, IP, finance and other services are essential underpinnings for the AI revolution. The quality of platforms and the democracy in which they are used will be the fundamental sources to generate value, business growth, public services, and a better quality of life. The idea is that AI, through user-friendly platforms functioning at high speed and low cost, can reduce inequality (and not be a creator of it). Could AI even close the digital divide through automated intelligence?

This requires equal opportunities to share data and access platforms for all parts of society whatever background (technical, skills, education, resources, geographical region, household income, age, gender or religion).

These platforms need to be built upon some degree of open source values (as also mentioned in our above chapter on Competition) and be accessible to use or develop by a variety of stakeholders – from start-ups to growth companies to multinational

companies. Also, the workforce needs to be retrained or educated to adequately use these platforms, in order to apply them in their daily routines.

As a direct result, these platforms can help the sharing of data, encourage an open innovation environment, and assist the process of creating AI solutions and technologies to the benefit of all. The particular policies and business governance of such platforms are yet to be discussed in UK Parliament (under the All Party Parliamentary Group on Artificial Intelligence).

## Corporate Governance

Furthermore, traditional corporate governance processes and structures have to be rethought and rebuilt to match the characteristics of an AI-filled world. AI technologies have the potential of opening doors to mass opportunity, in terms of economic and social benefits for society. However, stakeholders have also identified a series of potential drawbacks that AI technologies could bring to society (i.e. job disruption, inequality).

Formal and informal structures within a company's governance can be introduced to help prevent these drawbacks from surfacing. A promising proposal is the idea of an Ethics Board within each company or an overarching Ethics Board between companies.

As described by Tabitha Goldstaub, co-founder of an AI market intelligence platform, some of the biggest players in the field – Amazon, Google/ DeepMind, Microsoft, Facebook, Apple, and IBM – have already formed a union called Partnership on AI “to study and formulate best practices on AI technologies, to advance the public's understanding of AI, and to serve as an open platform for discussion and engagement about AI and its influences on people and society”.

**“Every company should have an AI Ethics Board. It's a bold statement but if we want to have people having these discussions, we should be encouraging companies to do that themselves – internally - rather than always coming from the outside.”**

**Tabitha Goldstaub**  
Co-Founder  
CognitionX



Groups such as these have to be encouraged in order to make sure stakeholders guarantee AI addresses the ethical concerns in scrutiny. Stakeholders can work internally, within corporate boundaries, to assure their products/decision-making processes are “moral.”

Furthermore, stakeholders can work across corporate boundaries, to ensure the community operates under common standards and values. Traditional key performance indicators should be reconsidered in order to match the new environment emerging technologies are forming. A project or an employee’s success should be assessed on a new set of standards that adequately reflects the AI environment.

## Trust

Beyond doubt, the AI revolution will not be able to flourish if government, business, academia, and the broader general public don’t trust the technologies.

Currently, the public lacks understanding of what AI is, how it can be used, and what its impact is. In fact, most people think of the Hollywood version of artificial intelligence when they hear the term. They associate AI with a threat to privacy, employment, and, even, mankind.

In order for trust to be created, we need formal standards and business practices and informal agreed norms and routines, which is the ultimate form for trust creation. The various stakeholders need to work together to create these values and make sure they are embedded within their processes.

**“We need better coordination and consolidation of supply chains across more companies. How can you use technologies to help coordinate activities where in a sense people see themselves as competitors but they need win-win strategies in finding ways of working together? There is a role for government to create infrastructure or incentives to get people to work together: there will be something in it for you because otherwise we will have to build more ‘roads’.”**

**Paul Clarke**  
Chief Technology Officer at Ocado

Technology is being developed at a remarkable speed and, hence, stakeholders need to make sure that society is given time to absorb all these disruptions and transformations. The transition period should be as smooth as possible. Therefore, as Shamus Rae argues, AI applications should include a human factor because society still needs the emotional connection.

**...whatever can be automated over the next five years should be automated.**

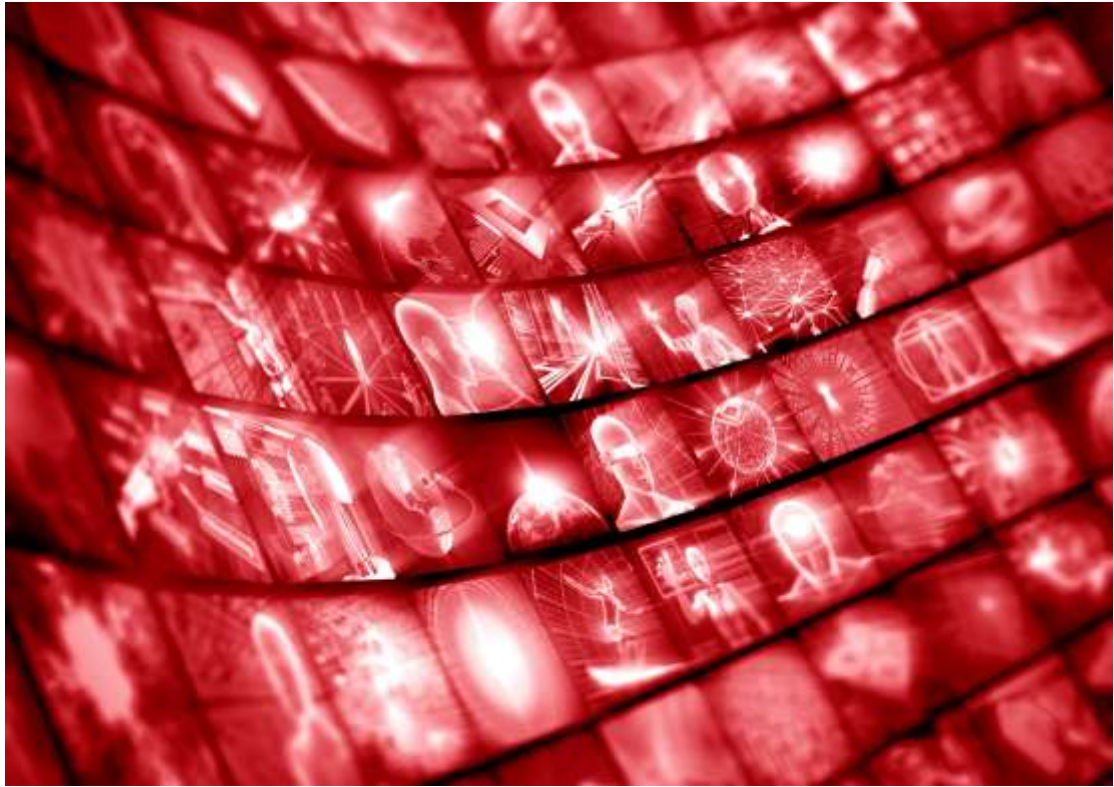
“The model where you sell people by the hour for audit and advice has gone. The model has to change. I spend a lot of time with CFO of FTSE organisations and they talk about whatever can be automated over the next five years should be automated ... They will still want a relationship and expert point of view because of the emotional connection but that is more about having trust in the system. Over the next three to five years professional services will go through lots of digitisation and all the services that can be automated will be automated.”

**Shamus Rae**

*Head of Innovation and Investments  
KPMG*

Government, business, academia, and the wider public need to think creatively and work together to let AI flourish and unlock trading opportunities. In a complex, competitive and highly regulated world, the revolution will not happen by itself. All stakeholders will have to play a role to ensure society reaps the full benefits.

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**Big Innovation Centre**

Ergon House  
Horseferry Rd  
London SW1P 2AL

[info@biginnovationcentre.com](mailto:info@biginnovationcentre.com)  
[www.biginnovationcentre.com](http://www.biginnovationcentre.com)