

# DISRUPTING THE FUTURE

HOW BUSINESSES CAN EMBRACE ARTIFICIAL INTELLIGENCE,  
BLOCKCHAIN AND THE INTERNET OF THINGS

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In partnership with



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*With leading entrepreneurial talent, a competitive financial ecosystem and world-class research and development the UK has a golden opportunity to lead the way in unlocking the potential of new technologies and build upon its reputation as a renowned hub for disruptive innovation.*

## **Adoption of technology is essential to raising productivity, spreading prosperity and opening-up new paths for growth**

Every business has the potential to take advantage of the digital revolution and embrace the opportunities that arise from adopting new technologies:

- CBI research shows that 94% of businesses believe that digital technologies are a crucial driver of increased productivity.<sup>1</sup>
- Businesses that innovate grow twice as fast, both in employment and sales, than firms that fail to do so.<sup>2</sup>
- Adopting new technology gets the best out of people, 50% of labour productivity is driven by innovation<sup>3</sup>

## **Artificial Intelligence, Blockchain and the Internet of Things are set to go mainstream**

The CBI's major innovation survey highlighted these game-changing innovations as the key technologies that will be transforming businesses in the next five years.<sup>4</sup> The Internet of Things unlocks big data. Artificial Intelligence solves problems. Blockchain changes how businesses exchange value. Companies of all sizes, in any sector and across the UK have the potential to benefit.

Technologies such as cloud were seen as niche a few years ago, now they have matured to underpin much of UK business infrastructure. The same potential is there for these cutting-edge innovations. However, while these technologies are in action now, limited adoption, regulatory hurdles and a lack of business understanding mean that the benefits of these innovations can be slow to benefit the wider UK economy.

## **Businesses and government need to be ambitious to make the most of these cutting-edge technologies**

For the UK to be globally competitive, for new higher skilled jobs to be created and for businesses to solve the pressing challenges society faces, we need to be bold in making the most of new technologies. Technology is a force for good, but getting the most from technology requires a deep partnership between government, business and people.

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<sup>1</sup> CBI, Embracing Digital In Every Sector, 2015

<sup>2</sup> NESTA, The Vital 6%, 2009

<sup>3</sup> NESTA, UK Innovation Index: Productivity and Growth in UK Industries, NESTA Working Paper 12/09; Innovation, knowledge spending and productivity growth in the UK, 2009

<sup>4</sup> CBI, Innovation Survey, 2016

The UK has a great record in adapting to changing technology and it's crucial that we navigate our path towards it together.

Many enterprises are up for the challenge, with over a third of companies categorizing themselves as digital pioneers, early adopters of technology. However, a quarter of UK businesses see themselves as followers in the digital revolution. These firms wait for technologies to go completely mainstream before testing them and many do not have a digital strategy that looks more than three years ahead.<sup>5</sup> Low awareness and understanding of technologies hold businesses back and with the pace of change accelerating there is a clear need to showcase what is possible.

### **The ambition for this report is to:**

- Profile the potential of Artificial Intelligence, Blockchain and the Internet of Things and make them real for businesses
- Explore the tangible benefits of technology adoption and flag up the barriers harnessing new innovations
- Highlight specific recommendations to government to improve the development of these technologies and tips for businesses looking to adopt them

*Disclaimer: The stakeholder engagement and analysis was undertaken in partnership with Vodafone. The CBI is responsible for the written content of the report and government recommendations.*

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<sup>5</sup> CBI, Embracing Digital In Every Sector, 2015

# Artificial Intelligence

*The world stands on the brink of technology driven change and the advancement of Artificial Intelligence is one of the driving forces behind this movement*

## Artificial Intelligence 101

The term Artificial Intelligence (AI) was coined in the 1950s, but its potential is only now starting to be realised. AI is an umbrella term to describe technology that exhibits behaviours that appear intelligent and autonomous. From predictive text to deep neural networks, AI is an evolution in computing and the way we look at data.

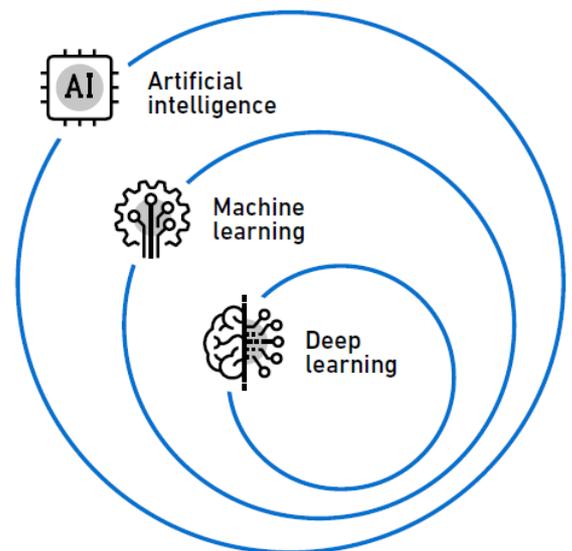
There are three broad categories of AI:

- 1) **Basic artificial intelligence:** Simple algorithms and rules that give the impression of intelligent computing. For example, simplistic chat bots or the enemy player in early arcade games.
- 2) **Machine learning:** Computing that has the “ability to learn without being explicitly programmed”.<sup>6</sup> From pattern recognition, to predictions, this type of AI learns through training and the quality of analysis improves with experience. For example, being able to predict when a machine will fail in a factory or Netflix recommending new films to users.
- 3) **Deep learning:** A modern advancement in AI, the core feature of deep learning is that it’s based on practice and feedback, rather than complicated rules. It is a subset of machine learning and is only possible through high quality data that is processed and analysed in a similar way to the human brain. Deep learning creates a neural network that becomes more sophisticated as more data is added. For example, the ability for a computer to detect tumours in medical images.

*“AI is the new java, it will be everywhere and in everything.”*

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

## What are the types of AI?



*“AI will have a big impact on the construction industry. One example where this is happening now, on a small number of live projects, is AI image recognition assessing if people are wearing equipment such as hard hats or hi-vis jackets to improve health and safety standards on the construction site.”*

**Dr Stephen Hamil, Director of Research and Innovation, NBS**

*“AI technology has the potential to augment human cognitive function. A novel use is minimising the psychological impact of viewing distressing imagery. Content moderators and the public sector have to manually process and analyse increasing volumes of sensitive and violent online content. AI can support these users, learn over time and take on more responsibility. This frees up people to do other work and reduces the psychological harm.”*

**Ben Gancz, CEO, Qumodo**

<sup>6</sup> Arthur Samuel, Some Studies in Machine Learning Using the Game of Checkers, 1959

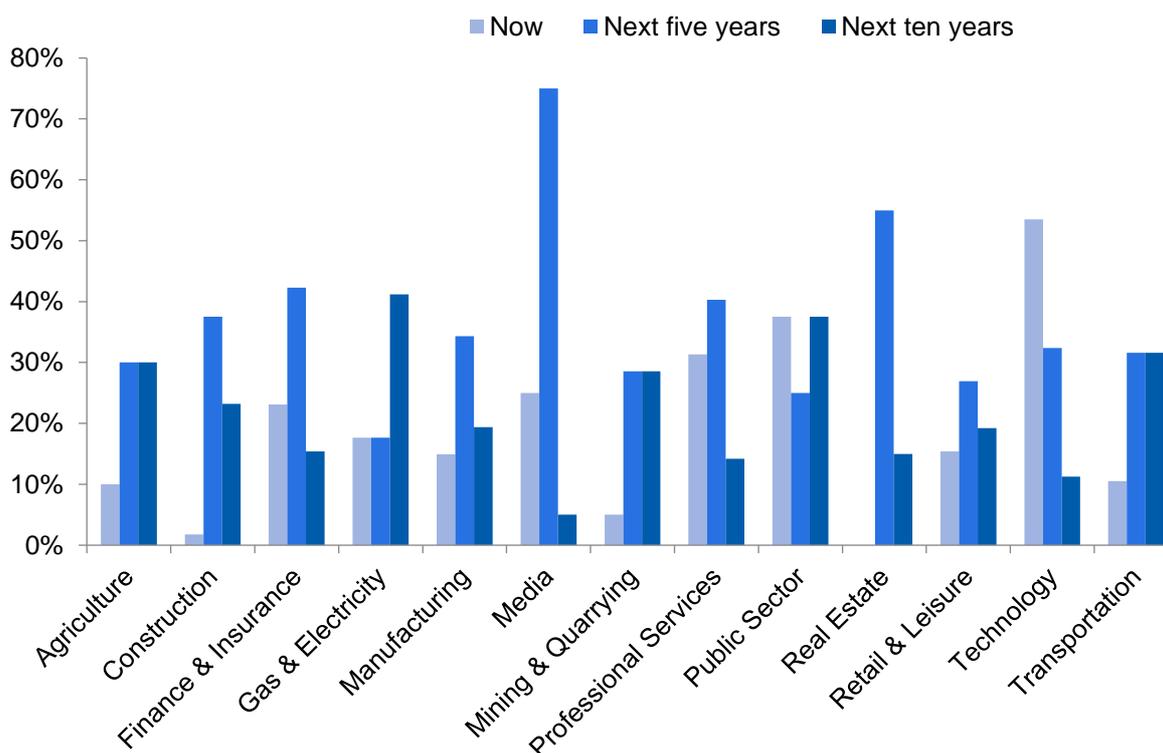
## What's the current landscape for adoption?

A major shift is on the horizon as businesses look to unlock the potential of AI. Over the next 5 years, AI holds the top spot as the technology set to impact companies across all sectors.<sup>7</sup> The emergence of AI as a technology that is on the brink of becoming engrained within business products and services is due to three main factors:

- 1) New, abundant and high-quality data. 90% of the world's data has been created in the last 24 months.<sup>8</sup>
- 2) Development of affordable sophisticated hardware to handle the processing of vast sums of data and evolving algorithms that benefit from the richness of information and power of the computing.
- 3) Availability of cloud technology that enables developers and businesses across the world to collaborate and experiment with AI models.

The concoction of excellent data, powerful computers and cloud technology has propelled AI to lead the charge for business investment. 42% of companies are planning to devote resource to adopting AI over the next 5 years, while 1 in 5 companies have already invested in AI in the past 12 months.

## When is AI likely to impact the sector in which your company operates?



The above graph gives insight into business' perceptions on when AI will impact their sector.<sup>9</sup>

*“The last 10 years have been about building a world that is mobile first. In the next 10 years, we will shift to a world that is AI first.”*  
**Sundar Pichai, CEO, Google**

<sup>7</sup> CBI, Innovation survey, 2016

<sup>8</sup> IBM, 10 Key Marketing Trends, 2017

<sup>9</sup> CBI, Adopting the Future survey, 2017

# Why are businesses excited?

## 1) Unmatched efficiency

Just as the first computers led to massive gains in productivity, AI has the demonstrable ability to speed up typical business activities. 80% of businesses believe that AI will enhance efficiency.<sup>10</sup> From reading contracts, to answering common customer queries and analysing meter readings, AI's processing capabilities chart a path to unlocking productivity gains.

### Case study: Ownet is a consulting business that leverages technology and its unique model to increase value and lower costs for clients executing change initiatives

- Ownet has developed an AI tool that is specialised in interrogating contracts and extracting key data points. Currently, a company with 10,000 contracts requires an average of 3,300 hours of human review (or 137 days) to extract and process the information.
- Ownet's AI can read 10,000 contracts in 50 seconds and then offer the employee options on the decision that should be taken about the contract.
- This technology has reduced human error, saved time and enabled experts to spend time making decisions that add value rather than pulling out data from contracts.

## 2) Smarter decisions and predicting the future

Data is the currency of the modern business environment and UK consumers top the list when it comes to using technology in our daily lives. From supermarket loyalty cards to live data on financial markets, the proliferation of information means AI technologies have an abundance of information about the past and present.

### Case study: Performance Horizon is a marketing platform that works with the biggest brands in the world

- Performance Horizon's platform allows clients to view reports on the performance of their marketing partners. The challenge is that traditional reports are retrospective.
- Investing and adopting AI into their platform opened the possibility for their clients to gain greater insights from the platform with predictive reports. E.g. What sales performance can I expect from my marketing partners in the future?
- Instead of retrospective reports, clients now have the ability to forecast, get a better sense of what is normal / abnormal performance and test new commercial scenarios.

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<sup>10</sup> CBI, Adopting the Future survey, 2017

This high-quality data and the intelligent processing capability of AI unlock the possibility of making predictions. 75% of businesses recognise that AI will help with prediction and pre-emptive decisions.<sup>11</sup>

**3) Standout from the competition**

AI has captured both consumer and business imagination. 70% believe AI will differentiate their business from competitors.<sup>12</sup> The combination of being able to spot incoming trends, interrogate data in innovative ways and develop new products and services makes AI a launchpad for business differentiators.

**Case study: Ocado is the world’s largest online only grocery retailer. Ocado have no physical stores and deliver direct to their customers from huge automated warehouses**

- Ocado has over 50,000 items of stock and their customers have on average have 50 items per order. The business is on a journey to build the "broadband of grocery", where the right groceries turn up at the right time as if by magic, without customers even having to order them.
- AI is transforming numerous areas of the business – from the predictive analytics to help their customers shop faster and with less friction, to using machine learning to control the flow of orders around the warehouses and improve real time optimisation of their swarm robotics technology.
- Taken together these applications offer huge competitive advantages and significant incremental gains across the whole of the business.

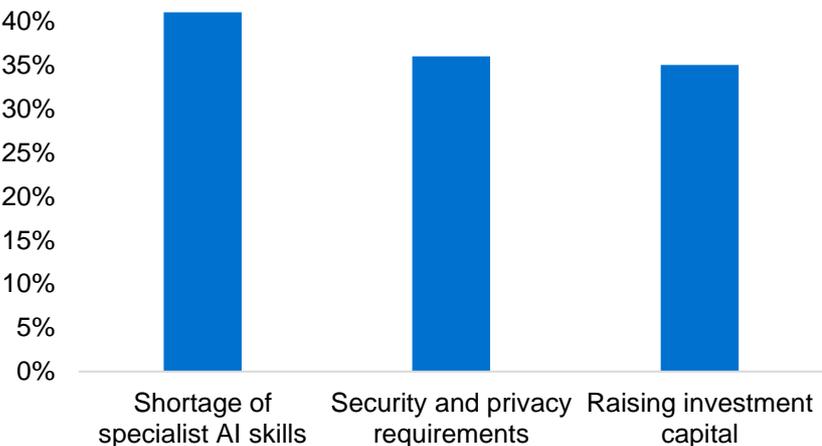
**What are the barriers to adoption?**

The societal and economic benefits unlocked by AI are recognised by many companies. However, there are clear barriers to adoption that can slow down uptake in businesses. CBI research shows that the barriers are not uniform, rather that they can shift depending on a business’s approach to innovation and their comfort in taking on new technology.

**What are the challenges for pioneers?**

Pioneers are businesses that identify themselves as early adopters and champions of digital innovation. Pioneering firms are actively exploring the different applications of AI, though still face tests in mastering the technology.

**Barriers to business adoption of AI for ‘pioneers’**



<sup>11</sup> CBI, Adopting the Future survey, 2017  
<sup>12</sup> CBI, Adopting the Future survey, 2016

### 1) Shortage of specialist AI skills

Traditionally the development of AI has been in the academic field, translating those skills into a commercial environment is a hurdle for businesses. Only a third of pioneer businesses say their company has the skills and capabilities needed to adopt AI technologies.<sup>13</sup>

### 2) Security and privacy requirements

Data is the core of AI, both personal data and non-personal data such as machine to machine generated data. This data is the key to huge digital opportunities, but it comes with an element of risk. Cyber breaches are a staple of the modern business environment with just under half (46%) of businesses experiencing an attempted breach in 2017.<sup>14</sup>

Addressing concerns around cyber security and how that data is protected is a key barrier for pioneering businesses looking to invest and adopt the technology. Businesses who make cyber security and data protection a boardroom priority with cross-business support and best placed to adopt AI.

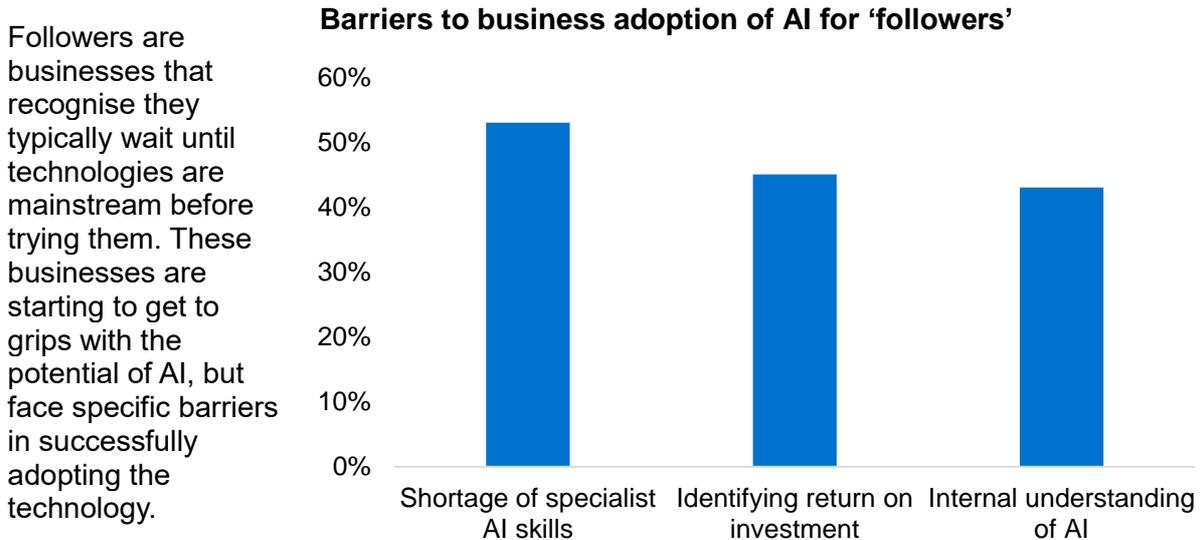
### 3) Raising investment capital

There are numerous options available to businesses looking to adopt AI solutions, everything from open source AI available on the cloud, to proprietary systems that require bespoke development.

The UK has a thriving financial scene, from traditional bank debt, to alternative finance and increasing equity options, there are a diversity of choices for ambitious innovative businesses. The challenge for pioneers is awareness of these options and deciding which type of finance is suitable for their project.

The government's review into patient capital is welcome news for innovative businesses and should be a key milestone in helping firms invest in long-term projects and a cornerstone of the UK's Industrial Strategy.

### What are the challenges for followers?



<sup>13</sup> CBI, Adopting the Future survey, 2016

<sup>14</sup> Department for Culture, Media & Sport, Cyber Security Breaches Survey, 2017

### **1) Shortage of specialist AI skills**

The skills gap for AI impacts pioneering firms and followers alike, though CBI research shows it's more acute for firms who have a follower mentality when it comes to innovation. All the main blockages for adopting AI in follower businesses are interlinked and stem from the skills barrier, in particular the knowledge and understanding to make the case for AI.

### **2) Identifying return on investment**

AI is undeniably a transformative technology, but it is sometimes difficult for follower businesses to identify return on investment until the AI has been developed and tested. For many followers, making the internal business case and clearly identifying what products and services can embed AI technology is a main barrier.

### **3) Internal understanding of AI**

Businesses who wait for new technologies to become mainstream tend to have lower awareness of the benefits of new technologies. AI in particular is often associated with science fiction and media spectacles which can make it challenging to refine how the underlying technology can benefit the 5.4 million small and medium sized businesses in the UK.

### Government recommendations:

- 1) **Representation:** Government should set up a joint Commission in 2018 involving business, academics, employee representatives and a minister to examine the impact of AI on people and jobs, with recommendations for action and policy.
- 2) **Funding:** Industry supports using the Industrial Strategy Challenge Fund to tackle societal issues using AI. Government should ensure the funding is available to a range of sectors and different types of challenges.
- 3) **Public data:** Government should ensure that public sector and government funded research data is open where possible with clear rights information and in machine readable format.
- 4) **Data collaboration:** Government should step up engagement with industry and the ICO in 2018 to develop a set of standard terms and conditions for data sharing related to AI development.
- 5) **Skills:** Government should ensure T-levels can lay the groundwork for an increasingly data literate workforce.

### Tips for adopting AI:

- 1) **Business collaboration:** Sharing best practice and insights is essential for firms to understand the potential of AI. Businesses should seek out opportunities to learn from their supply chain, use their Local Enterprise Partnerships and leverage the network of Catapults to broaden their knowledge and start adopting AI.
- 2) **Digital leadership:** Businesses with digital leadership at the boardroom level, not just the front line, are often well placed to take advantage of the opportunities that AI can unlock.
- 3) **Data mapping:** Firms should understand the different types of data they store and process and how it flows around their organisation in order to assess where the business can look to embed AI technology.
- 4) **Cyber resilience:** Make cyber security and data protection a regular board agenda item. Executives need to be able to ask the right questions of their teams e.g. Do we have an incidence response plan? How are our staff trained to spot cyber threats?

*“A great first step for businesses is to think clearly about what products and services they currently have which are ripe for AI. There are several questions to ask:*

- *Do I have a task which is rule based and repetitive?*
- *Is the process prone to human error?*
- *Is there a task which is low complexity?”*
- *Is there a high volume of transactions?”*

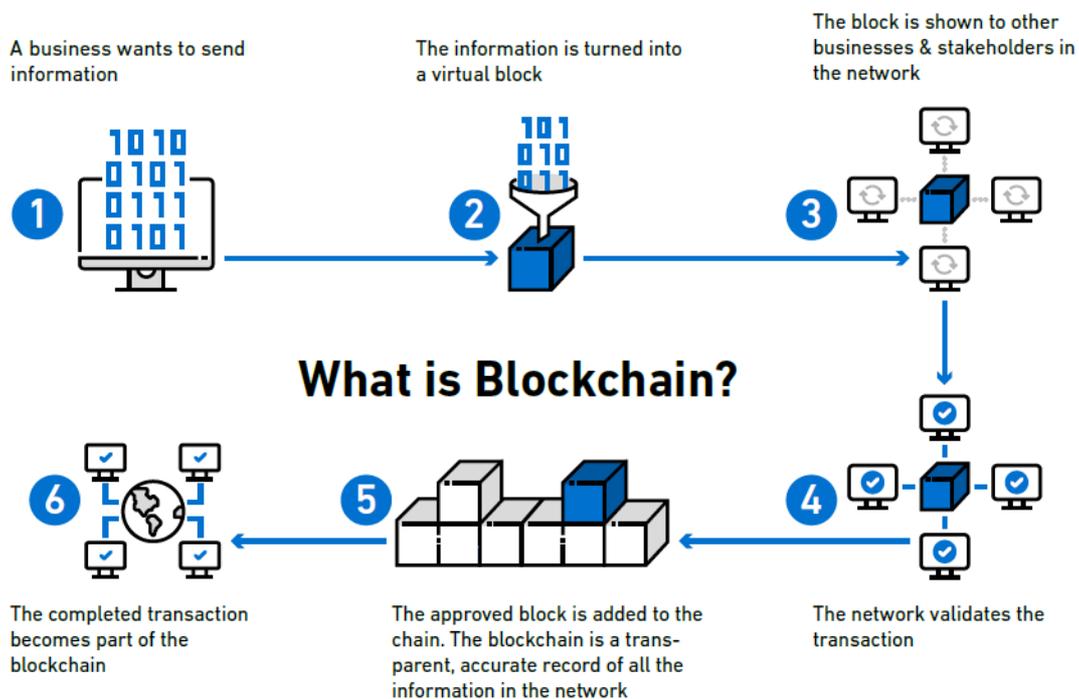
**Jeremy James, CEO, Ownet**

# Blockchain

*Blockchain has developed an air of mystery, but the core principles that underpin the technology are simple and the massive benefits to business are starting to be realised*

## Blockchain 101

Blockchain at its heart is just a virtual record of transactions. These digital, encrypted exchanges can be anything from the movement of data, goods or money. Transparency and security are the foundations of Blockchain. In practice, this means that everyone in the Blockchain network has access to the information about a transaction. Crucially, verification of a transaction is achieved by relevant users in the Blockchain agreeing to the exchange.



What earns Blockchain its disruptive credentials is the decentralisation of how information is exchanged. Currently, businesses rely on trusted intermediaries (such as banks or the government) to verify and exchange value digitally. These central systems are necessary to prevent fraud, however Blockchain technology removes the need for an intermediary as verification takes place through consensus of the users.

*“How Blockchain technology works isn’t actually that important. What matters is that it brings the ability to establish trust between two machines, people or entities, and then transfer value securely and transparently between them.”*

**Steve Webb, Partner, PwC**

The applications of Blockchain are numerous, but at its core the technology is a single, transparent record of information, a crucial innovation for companies that are sharing information and working with constantly changing databases.

### Case study: IBM is working with leading supermarkets to track food through the supply chain

- High standards of food safety, tracking damaged produce and transparent supply chains are essential for all retailers and go to the heart of consumer trust.
- In traditional food supply chains, it can take numerous days to accurately trace produce back to the original farm or factory. For example, on average it can take six days to track apples back to the orchard.
- Retailers currently work off multiple databases with thousands of suppliers. Blockchain technology has the potential to simplify that process.
- During trials, supermarkets were able to establish the exact path produce took from farm to shelf in seconds. Blockchain enabled retailers to work off a single source of information and have complete transparency about their food supply chain.

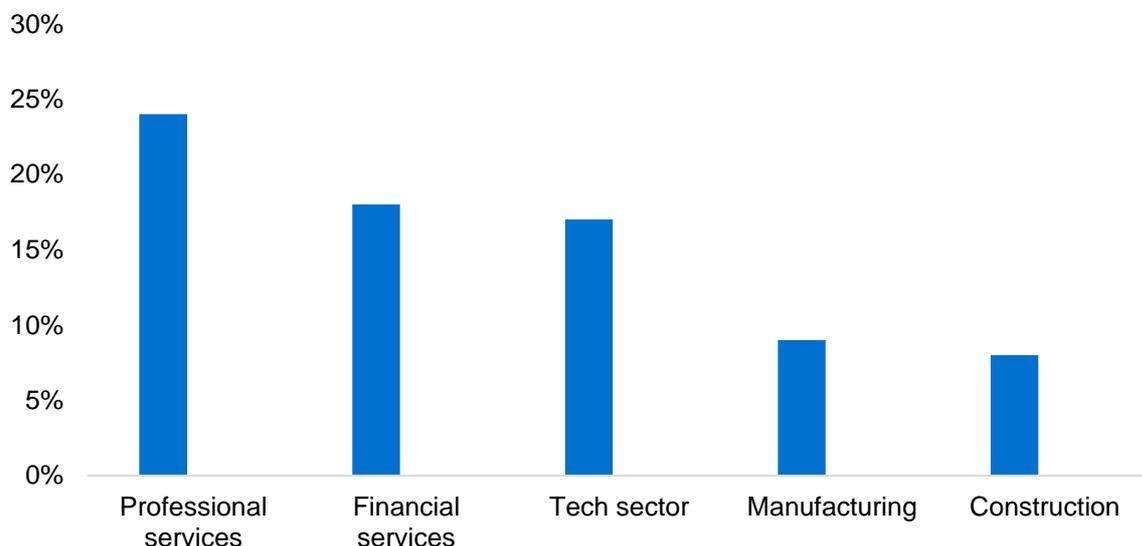
*“The construction industries are entering a period of major disruption caused by new technologies such as Blockchain, as well as Artificial Intelligence (AI), Internet of Things (IoT) and Building Information Modelling (BIM). As the ‘Trust Protocol’, Blockchain offers a unique opportunity for transparency, unity and optimization of one of the most fragmented and complex industrial activities.”*

**Professor Alan Penn, Academic Leader, Construction Blockchain Consortium, UCL**

### What’s the current landscape for adoption?

The technology underpinning Blockchain was pioneered over nine years ago, but only in the last few years has it started to gain mainstream recognition.

#### Sector investment intentions for Blockchain over the next five years



Businesses are hugely intrigued by the potential of Blockchain. Over the next five years, it holds the number two spot as the technology set to influence businesses across all sectors.<sup>15</sup> While Blockchain is often associated with the financial services sector, the technology has massive cross-sector potential. The graph shows that professional services, financial services, tech, manufacturing and construction are the top five sectors planning to invest.<sup>16</sup>

## Why are businesses excited?

### 1) Trust & transparency

Blockchain records are the ultimate audit trail. Everyone in the Blockchain network has access to the information about transactions. Any changes or updates to the digital information is achieved by consensus, which makes it a secure and transparent system. Blockchain creates a virtuous cycle where the longer the Blockchain network is used, the more trustworthy it becomes.

*“A core value of Blockchain is its ability to be a single trusted source of information. That innovation is at the heart of why financial services are so excited about adopting the technology.”*

**Matt Digby, Director Strategic Initiatives, NEX Group**

#### **Case study: Logicon Systems are working with parcel and logistic industry partners to digitise the supply chain**

- Using digital platforms and blockchain technology, stakeholders are looking to transform the parcel supply chain
- Blockchain technology enables businesses to share information in real time, from item descriptions, to value and payment information. This paves the way for auto-invoicing and faster tax payments to respective treasury authorities
- The transparency of the information in the blockchain network will protect against fraud and help create a wealth of data to optimise the entire logistics supply chain and provide evidence to government to improve policy making.

### 2) Unparalleled security

Using cryptography, Blockchain is designed to store information in a way that makes it virtually impossible to add, remove or change data without it being detected by other users. The security of the platform makes it possible to transfer highly valuable assets, from currency to property rights.

*“What distinguishes Blockchain is its potential to give visibility to your business’ supply chain. A transparent, accurate and robust means of having complete certainty of where your goods and services are coming from. That has huge implications for every sector from retail to manufacturing.”*

**James Cohen, Chief Technologist, Hybrid IT & Bob Falconer, Consulting Services Executive, Hewlett Packard Enterprise**

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<sup>15</sup> CBI, Innovation survey, 2016

<sup>16</sup> CBI, Innovation survey, 2016

### 3) Removes intermediaries

Current transactions rely on a central point of contact, whether a bank or government office, to verify the exchange. Blockchain technology removes the need for this intermediary, this unlocks huge savings in time, cost and risk. Blockchain can handle transactions in minutes that would usually take weeks to process using paper, particularly cross-border transactions.

The lack of a central authority also increases the resilience of the technology as there is no single point of failure. In current transaction systems, if the central system goes down the transaction cannot be processed.

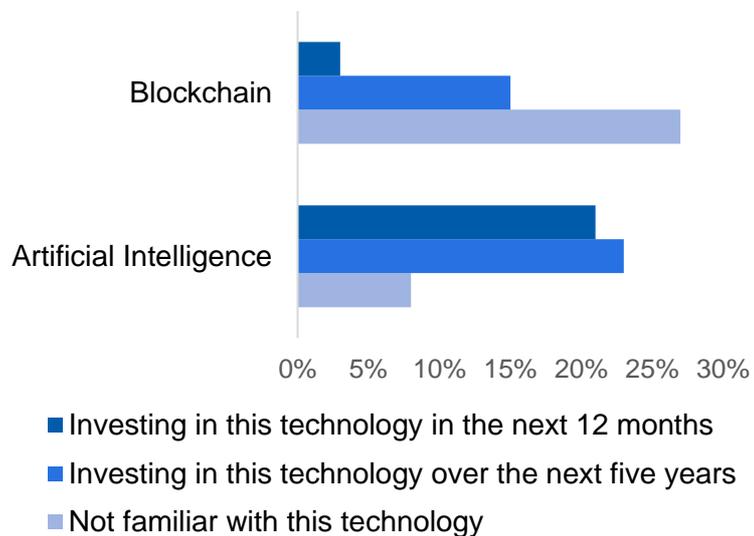
## What are the barriers to adoption?

### 1) Raising awareness and understanding

While many businesses expect that Blockchain will impact the sector in which they operate, individual firms are less ready to take it up.

Compared with AI, investment intentions are lower. Over the next 12 months businesses are planning to invest more in AI, but the gap closes over the next 5 years.<sup>17</sup>

Crucially, understanding and awareness of Blockchain is much lower than AI. Businesses are interested in the potential of Blockchain, but there is clear work to be done when it comes to understanding the core benefits of Blockchain and how it can be applied in different sectors.



### 2) Building business cooperation

Blockchain is a network and common standards need to be agreed between participants. Key questions need to be answered such as, what type of platform are we using? What type of data is being shared? The answer to these questions requires a significant amount of collaboration and time in order to facilitate these networks.

### 3) Standardising implementation

Although Blockchain has been around for nearly 10 years, it is a relatively nascent technology. One of the issues is formalising the standardised implementation that will allow regulators and businesses to have confidence in adopting this technology.

<sup>17</sup> CBI, Innovation survey, 2016

The technology spans different sectors which makes it difficult to co-ordinate regulations. Regulators want assurance that Blockchain can meet standards for Know Your Customer checks and meet new data protection rules.

*“HSBC is committing significant resources towards Blockchain and Distributed Ledger Technology more generally across a number of different business areas. The technology has the potential to deliver fundamental beneficial changes in financial services, including increased speed, security and a transparent record of activity. Collaboration is important in order to achieve scale and as a global bank the technology also needs to be globally interoperable, so the industry and policy makers will need to work closely together to achieve this.”*

**Kaushalya Somasundaram, Head of FinTech Partnerships, Strategy, HSBC**

#### **4) Building the skills pipeline**

Blockchain is a complicated technology to develop. Maths skills are needed to develop the cryptography that underpins it. Since 2016, the number of adverts on LinkedIn for Blockchain has trebled.<sup>18</sup> Currently demand outstrips supply and looking to the future businesses will need access to global talent to fill skills gaps and help them compete internationally.

*“There is a talent war going on for Blockchain specialists. It’s a hugely exciting technology for us as an app development business, but we had to work with specialists to be ahead of the curve.”*

**Sarat Pediredla, CEO, hedgehog lab**

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<sup>18</sup> Financial Times, Blockchain-related job adverts surge, 2016

### Government recommendations:

1. **Best practice:** Blockchain technology spans different sectors and will require regulatory co-ordination at both a domestic and international level to avoid fragmentation and encourage industry collaboration. Regulators should work closely with the different industry consortia and the Financial Conduct Authority (FCA) to share best practice and learnings.
2. **Technology neutral:** Regulators should continue to operate a technology neutral approach to new regulation. In practice this means focusing on the outcomes that blockchain achieves – not the process. Blockchain should be judged by how it meets regulatory standards such as anti-money laundering obligations and know your customer checks.
3. **Movement of goods:** Government should work with industry stakeholders and academics to understand how Blockchain technology in the long term can improve the UK's customs regime in the future.

### Tips for adopting Blockchain:

1. **Information overload:** Does your business or supply chain work across multiple sources of information that are constantly changing? Blockchain technology could be the answer to simplifying that process, speeding up access to information and improving transparency across your network.
2. **Consistent database:** Identify where a single indisputable source of data with high security standards would benefit your business and supply chain and work with stakeholders to agree what data should be included.
3. **Don't do it alone:** Are there common challenges your industry faces that require transparent collaboration? The investment case is stronger with multiple parties agreeing to collaborate on Blockchain.

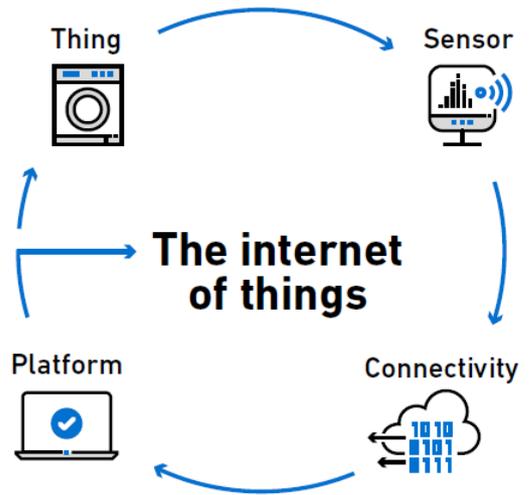
# Internet of Things

*The simplicity and flexibility of the Internet of Things paves the way for businesses in all sectors to harness the power of this technology*

## Internet of Things 101

The Internet of Things (IoT) is a concept used to describe an asset that has been fitted with a sensor that produces data on its use. A 'thing' can be anything from industrial machinery, to streetlights and even a kettle. Gartner predicts that 25 billion "things" will be connected to the IoT by 2020.<sup>19</sup>

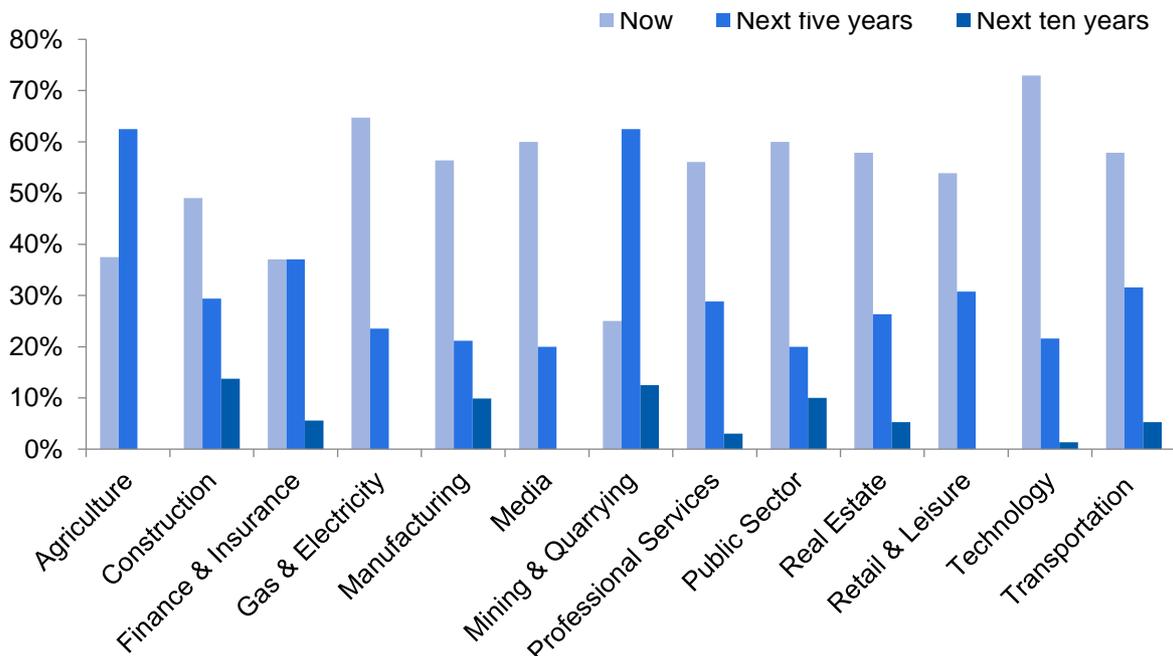
IoT earns its disruptive innovation potential through its ability to open up the possibilities of big data. It enables businesses to understand what's happening in their operations in real time and chart a path towards significant productivity improvements. The high-quality, accurate and evolving information also marries perfectly with unleashing the potential of AI.



## What's the landscape for adoption?

The maturity of IoT is reflected in the technology gaining mainstream recognition. Over half of business (54%) are investing in the technology now. The sectors leading the charge are energy and technology.

### When is IoT likely to impact the sector in which your company operates?



<sup>19</sup> Gartner, Predicts 2015: The Internet of Things, 2015

The graph gives insight into business' perceptions on when IoT will impact their sector.<sup>20</sup> In comparison to AI and Blockchain, the technology underpinning IoT is more established and there are successful adoption stories across a wide range of sectors.

*“What makes smart connected products fundamentally different is not the internet, but the changing nature of ‘things’. It is the expanded capability of smart, connected products and the data they generate that is ushering in a new era of competition to manufactures.”*

**John Hannah, Robotics and Autonomous Systems Market Lead, CEO, Tharsus Group**

#### **Case study: EA Technology is a technical consultancy that specialises in making electricity networks more efficient and cost effective**

- OpenLV, which is a project funded by Innovate UK and Ofgem, is set to revolutionise the smart grid in the UK.
- Current electricity networks do not have a lot of monitoring embedded in them, but through IoT technology industry stakeholders and the wider community will gain more insight into their local electricity network.
- One of the main benefits of IoT is to be able to view the electricity grid in real time. The technology provides the framework for the development of apps to monitor usage, adjust power levels based on demand and improve service for consumers.

Momentum is building, 73% of businesses say that IoT will be critical to their future success.<sup>21</sup> What makes it a technology that will increasingly impact business in the next five year is the potential for IoT to revolutionise how businesses create and use data.

## **Why are businesses excited?**

### **1) Real time intelligence**

IoT brings everyday business devices to life. Once static machines now can produce data about past, present and future performance. From tracking stock level in retail, to anticipating part failure in a construction business, IoT enables devices to relay real time information to a business.

*“We needed to move from a position of reactive, even proactive servicing, to preventative maintenance.”*

**Marc Schneeberger, Business Development Manager, Feintool**

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<sup>20</sup> CBI, Innovation survey, 2016

<sup>21</sup> Vodafone, Internet of Things Barometer, 2016

**Case study: Green Energy Options are an energy technology firm that focus on developing connected home devices**

- Water damage, such as flooding or excessive mould is the single largest risk to UK homes. Green Energy Options (GEO) have developed an IoT technology, WaterLock, to monitor the usage of water pipes.
- WaterLock allows the consumer to detect leaks and isolate them, which can save households huge amounts of money. The typical cost of household damage caused by burst pipes is £7000.
- The insurance sector are working closely with GEO as 70% of payouts on residential properties are linked to water damage. The IoT technology enables insurance firms to reduce claims and bring down premiums.
- GEO have invested over £5m in the IoT platform that manages the data and have big plans to use AI to analyse the patterns produced by the information.

**2) Building closer relationships with suppliers and customers**

The data produced can establish trends, showcase new evidence and reveal flaws in business operations. This information can form the basis to build stronger links between a business and its suppliers and customers.

**Case study: Polar Krush are makers and distributors of crushed ice beverage machines and the syrup used in each drink**

- In the UK there are over 5000 Polar Krush machines that are distributed to and used by business customers. Polar Krush has a contract with the businesses to re-stock the machines with bespoke syrup. The challenge was customers would re-order stock inconsistently, machines over time would need repair and in some cases occasionally get stolen.
- The technological solution to these different issues was to embed IoT in the Polar Krush machines. The technology can monitor the usage of the syrups and send an alert when stock is running low which sparks a re-order process. Additionally, preventative maintenance is now possible which reduces machine down time and lowers the amount of engineers being sent out.
- Fewer stolen machines, increased customer satisfaction and more reliable cash flow led to Polar Krush doubling their revenues in 2016.

**3) Create new revenue streams**

IoT unlocks insights which pave the way for new customer deals, evolving business models and improves the use of traditional assets. From tracking devices to more efficient machinery and even turning products into a service.

For example, in the automotive industry, manufacturers are investing heavily in software and collaborating with technology companies to develop connected cars. This huge investment marks a shift from a core focus on the product to the opportunities and added-value that services like autonomous driving and hyper-connectivity can provide.

### **Case study: Van Moof is a Dutch company that manufactures and sells high-end bikes**

- The trouble with beautiful bikes is that they tend to get stolen. Given they're not cheap, this was putting off customers. Van Moof needed a way to track the bikes that can't be easily disabled.
- The IoT tracker developed, which is hidden inside the frame, means the owner can find the location of the bike to the accuracy of 5m. The reliability of the IoT technology they started a marketing campaign which simply read 'Buy a Van Moof bike, if it gets stolen and we can't find it for you, we'll give you another one – FREE'.
- Sales increased by over 100%. People want beautiful bikes and now they can buy them safe in the knowledge they won't lose them.

## **What are the barriers to adoption?**

### **1) Security of the devices**

Connecting devices enables huge digital opportunities for businesses, but with these possibilities comes an element of risk. Cyber breaches are a staple of the modern business environment with just under half (46%) of businesses experiencing an attempted breach in 2016.

The primary concern for businesses looking to adopt this technology is how to ensure cyber security is built into the asset and that the data produce is properly protected. Businesses who make cyber security a boardroom priority with cross-business support and best placed to adopt IoT technologies.

### **2) Protecting data to the highest standards**

Data is the lifeblood of IoT and requires the most robust protection. The UK's new data protection laws, (better known as the General Data Protection Regulation or GDPR) which come into force May 25 2018, will set out clear guidelines on the collection and processing of data, particularly personal data.

For businesses with existing IoT applications and those looking to adopt the technology in the future, there needs to be consideration given to ensuring their processes and the suppliers they work with meet the new standards. With fines of up to £17m for mishandling personal data, business must place data protection at the heart of their adoption strategies.

## Government recommendations:

1. **Industry led standards:** Government should support the development of an industry led, voluntary IoT Code of Practice that sets out principles for security and privacy. IoT is possible for so many different devices that one harmonised rule for security is not practical and raises barriers for new market entrants.
2. **Data protection:** The General Data Protection Regulation sets a clear framework for safeguarding the data generated by IoT devices. The priority for government should be passing the UK Data Protection Bill so companies have adequate time to prepare for the new rules.
3. **Public sector:** Local government should explore the potential for IoT to solve local challenges and lower costs. From reducing congestion, to improving bin collection – the technology exists to improve these everyday responsibilities.

## Tips for adopting the Internet of Things:

1. **Identify the 'Things':** Assess what assets your business could monitor and how the data generated could be used to benefit your business.
2. **Scope out network and platform requirements:** Scope out what network requirements your assets will need (e.g. is the 'Thing' in a remote location?) and what platform your business will use to analyse the data.
3. **Cyber resilience:** Make cyber security and data protection a regular board agenda item. Executives need to be able to ask the right questions of their teams e.g. Do we have an incidence response plan? How are our staff trained to spot cyber threats?
4. **Cyber communications:** Businesses should communicate with suppliers and customers on how they are protecting their data. The first time a business gets in touch with customers or their supply chain should not be after a data breach.



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