CORPORATE DECISION MAKING & INVESTMENT

Best Practice Guidelines for AI Adoption

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ALL-PARTY
Parliamentary
Group on AI

Corporate Decision-making and Investment: best-practice guidelines for AI adoption is *a* Parliamentary Brief based on the All-Party Parliamentary Group on Artificial Intelligence's (APPG AI) online Evidence Meeting on 11th May 2020.

Stephen Metcalfe MP and **Lord Clement-Jones CBE** chaired the Evidence Meeting. It was organised in collaboration with **ICAEW's Corporate Finance Faculty**.

We would like to express our appreciation to the following people for their evidence:

- **David Petrie,** Head of Corporate Finance, ICAEW
- **Jan Chan**, Associate Partner, UK & Ireland Transaction Advisory Services Chief Innovation Officer, EY
- **Charles Radclyffe**, Head of AI, Fidelity International
- **Dr Zoë Webster**, Director – AI and Data Economy, Innovate UK
- **Dr Christine Chow**, Head of Asia and Global Emerging Markets, Hermes Investment Management
- **Naomi Climer CBE**, Co-Chair, Institute for the Future of Work
- **Sanu de Lima**, Deputy Director, Corporate Governance, Responsibility & Diversity Business Frameworks Directorate, Department for Business, Energy & Industrial Strategy

Rapporteurs: **Dr Désirée Remmert** (Big Innovation Centre) and **Shaun Beaney** (Corprate Finance Faculty, ICAEW)

Big Innovation Centre is the appointed Secretariat for APPG AI: **Professor Birgitte Andersen**, Chief Executive

The video recording of the Evidence Meeting can be found on our websites.

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PARLIAMENTARY BRIEF

Corporate Decision-making and Investment: best-practice guidelines for AI adoption

All Party Parliamentary Group on Artificial Intelligence

This meeting was a joint initiative with the Corporate Finance Faculty of the Institute of Chartered Accountants in England & Wales (ICAEW)

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Introduction: Corporate Decision-making and Investment – best-practice guidelines for AI adoption

The APPG AI evidence session *Corporate Decision-making and Investment – best-practice guidelines for AI adoption* was held online on 11th May 2020. This Evidence Meeting was organised with the Corporate Finance Faculty of the Institute of Chartered Accountants in England & Wales (ICAEW), who's extensive work on the future of AI in accountancy, business and corporate finance includes the detailed research report *AI in Corporate Advisory* (which can be accessed online at: www.icaew.com/aica).

The potential for the use of AI-based technologies in corporate decision-making is promising, if still at an early stage. Nevertheless, it can be expected that the adoption of some types of AI-based by public and private agencies, including companies, might be accelerated by the Covid-19 crisis. AI technologies are likely to play a pivotal role in boosting public and private investment, which will be crucial for a global economic – and social – recovery. It will also be vital for companies to ensure that there is public, business and investor confidence and trust when they use AI-based technologies and bid data to inform their decisions about investment, capital raising and M&A.
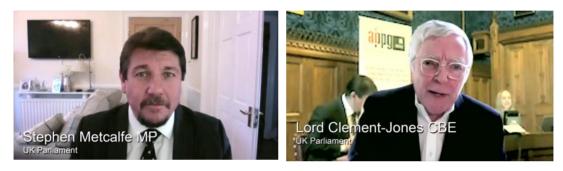
In this Evidence Meeting, we discussed how AI might influence critical corporate decisions at a board level, particularly those about investment. What would be the appropriate level of oversight by senior executives, advisers, investors, employees, and customers? What are the potential implications for corporate governance? How can these new approaches help to boost investment and innovation in the UK and support the UK's competitiveness?

The APPG AI Evidence Meeting convened a group of experts in investment, financial services and advisory, innovation policy, corporate finance and accountancy, and AI. They were

- **David Petrie**, Head of Corporate Finance, ICAEW
- **Jan Chan**, UK&I TAS Chief Innovation Officer, EY
- **Charles Radclyffe**, Head of AI, Fidelity International
- **Dr Zoë Webster**, Director – AI and Data Economy, Innovate UK

- **Dr Christine Chow**, Head of Asia and Global Emerging Markets, Hermes Investment Management
- **Naomi Climer CBE**, Co-Chair, Institute for the Future of Work
- **Sanu de Lima**, Deputy Director, Corporate Governance, Responsibility & Diversity, Business Frameworks Directorate, BEIS

This meeting was chaired by **Stephen Metcalfe MP** and **Lord Clement-Jones CBE. Parliament has appointed Big Innovation Centre** as the **Secretariat of the APPG AI**, led by **the centre's chief executive, Professor Birgitte Andersen**. The Project Manager and Rapporteur for the APPG AI is **Dr Désirée Remmert**. **Shaun Beaney** (Corprate Finance Faculty, ICAEW) was co-Rapporteur for this meeting.

The expert panel addressed the following questions in their evidence and the subsequent discussion:

1. **What should company directors take into consideration when deciding whether/how to implement AI-based technologies for 'augmented decision-making' about investment?**
2. **What are the most important corporate governance implications of the introduction of such technologies to decision-making and appropriate 'data governance'?**
3. **How might corporate boards and company advisers ensure responsible implementation of AI-based technologies and 'data governance' that help companies make strategy, investment, and M&A decisions?**
4. **How could AI-based technologies be utilised to retain companies' competitiveness when the world economy recovers from the Covid-19 crisis?**

This brief will outline the main issues that emerged in this meeting and will conclude with evidence-based recommendations for policymakers. The first chapter will explore the impact that AI technologies are expected to have on corporate decisions and investment in the near future. We will then discuss how corporate governance policies

and procedures might guarantee the safe and effective implementation of AI-driven business operations, and, in the third chapter, consider how AI technologies can facilitate responsible innovation in the field of corporate finance. The brief will conclude with evidence-based suggestions for policymakers to guarantee a responsible, fair, and effective application of AI technologies in the corporate decision-making, corporate finance and business investment.

From the evidence provided in this session, it emerges that the successful deployment of AI-technologies in corporate decision-making and investment depends on an **efficient and coherent AI strategy** that includes all phases, from implementing to scaling, as well as **regular audits** of the deployed AI technologies.

Further, **employees must be trained in the application of new AI technologies** as well as in the **accurate assessment of the results** they deliver.

Lastly, government must work with business to safeguard the **responsible use of AI technologies**, ensure the **upskilling of the workforce,** as well as **facilitating the supply of talent** through adequate policies, legal codes, and guidance.

1. Impact of AI on corporate decision-making and business investment

According to the widely cited official definition by the ICAEW's Corporate Finance Faculty, **corporate finance in the UK comprises the 'raising of start-up and venture capital, growth capital, mergers and acquisitions (M&A), capital markets and initial public offerings (IPOs), raising debt and alternative finance, capital for specialist investment funds, infrastructure investment, and turnaround finance'**.[1] Corporate finance investment and transactions play a vital role in national and regional economies and thus have an important impact on society. **Considering that the Covid-19 crisis will interrupt global investment patterns severely, David Petrie, ICAEW's Head of Corporate Finance, highlight the importance of finance-raising, corporate rescues, and turnaround investment for economic recovery and the significant contributions that AI technologies could make in these areas**. However, he also alerts us about the potential pitfalls of an overly hasty deployment of AI tools:

> *"[…] thinking ahead to the recovery from the crisis, it is very important to consider carefully the potential benefits and risks of AI-based applications for companies, investors, advisers and our wider society."*

The promise of AI technologies to make analyses and transaction processes more effective and accurate has attracted many investors to companies that are embracing these new tools. In 2019, companies' willingness to adopt new technologies quickly, coupled with the UK's strong legal framework and enforcement culture, was rewarded with a high level of corporate investment. Christine Chow, Head of Asia and Global Emerging Markets at Hermes Investment Management, illustrates the success of UK companies, particularly when compared with the country's European neighbours:

> *"Investments in the UK tech sector, concentrated on fintech, AI and clean energy, soared to £10.1bn (US$13.2 billion) in 2019, securing a third of the £30.4bn raised in Europe, beating Germany and France."[2]*

AI-technologies also play an important role in the streamlining and improvement of

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[1] Shaun Beaney and Rosanna Woods (2019): *AI in Corporate Advisory: investment, M&A and transaction Services*, ICAEW, p.5.
[2] *TechNation* (January 2015, 2020): 'UK tech sector beats both US and China to lead Global Growth in 2019.' https://technation.io/news/2019-a-record-year-for-uk-tech/

business operations and decision-making processes in companies, including M&A. Christine Chow suggests that corporate decision-making can be supported by AI in three key ways:

> *"First, it helps to identify opportunities. Keyword searches and news screens identify strategic fit and funding needs that help a potential acquirer build a pipeline of targets. Second, AI improves due diligence insights. Regulatory technology enables near-real-time legal and tax compliance checks that help to quickly establish the potential liabilities of a company. AI supports document management and processing for transactions. Big data-led factor analysis assess intangible qualities, such as corporate culture and customer trust. Location and asset level data, such as satellite images and on-site sensors help analysts collect and process data directly rather than relying on outdated disclosure-based methods. Third, AI strengthens scenario analysis. Interactive data visualisation helps decision-makers to get past the noise of big data and makes analytics agile."*

David Petrie points out that **virtual data rooms that include AI-based capabilities are already being deployed throughout M&A and private equity investment processes**. These are particularly useful for legal and financial analyses. Petrie anticipates that potential future uses range across origination, company valuations, due diligence, and post-transaction integration.

Jan Chan, Chief Innovation Officer in EY's UK & Ireland Transaction Advisory Services division, expects that **the Covid-19 crisis and potential staff-shortages would accelerate the adoption of AI tools to assist in the rapid evidence-based decisions that will have to be made by corporates and the government in the next few months**. For this reason, **accurate modelling and simulations of investment outcomes will be essential for responsible decision-making**. However, Chan explains that the interpretation of data and modelling results will still need human input for ensuring the accuracy and integrity of the data analysis on which decisions will be based. Chan emphasises:

> *"We cannot abrogate our responsibility for decision-making to the machines. AI can help identify good targets for both public and private investment, simulate outcomes of various investment scenarios, and optimise the use of existing resources, for example through staff rostering schedules, and logistics challenges."*

Naomi Climer CBE, Co-Chair of the Institute of the Future of Work, follows up on this point in her evidence. Climer emphasises that if AI were used to replace headcount,

it would be **essential to have "a human expert in the loop" who would detect flaws in the results of AI-driven auditing and analytics tools**.

Zoe Webster, Director for AI and Data Economy at Innovate UK, predicts that the impact of AI will go beyond a single industrial sector. Rather, it can be expected that many sectors will identify opportunities to employ AI-driven tools in order to boost productivity and to increase their competitiveness through improved products and personalised services. However, she warns that **UK businesses must adopt AI at a greater scale if they are to remain competitive in the global market**.

In line with evidence given by corporate and academic AI experts in previous APPG AI sessions, Webster argues that UK businesses across all sectors are not reaping the full benefit of adopting AI within their critical business processes. **The implementation and scaling of AI would be crucial because of the current shift in focus to resilience, to cope as a response to the Covid-19 crisis.** Webster says that the public sector can help mitigate the risks that business leaders have to assume when implementing AI into business operations.

2. AI and corporate governance

Despite AI-based technologies having already been successfully applied to some aspects of corporate oversight and governance, the evidence presented at this meeting suggests that general **AI capacity is still relatively low in the UK and that SMEs** in particular seem reluctant to utilise AI in their business operations. Whereas large professional services firms such as Deloitte, PwC, KPMG and EY have already produced some impressive results from AI-driven analytics, **the benefits of data-driven processes appear still "shrouded in mystery" and difficult to integrate into the technological strategy of smaller and medium-sized firms**, according to David Radclyffe, Head of AI at Fidelity International.

At the same time, Radclyffe argues that the economic crises caused by the Covid-19 pandemic has made the need for rapid implementation of AI in businesses only more urgent; smaller firms that will not adjust to new technological demands might not be able to stay competitive with big companies.

However, **before AI can be introduced and scaled, companies must decide on a clear strategy for the implementation and auditing processes of the new technologies**. This means that companies have to make sure that employees at all levels are educated about the new technologies and how they would benefit business operations, as well as how they will affect individual workplaces and tasks.

At board level, Christine Chow notes, **a thorough knowledge of basic statistical methods would be indispensable for a good understanding of AI-based decision-making**:

"Quantifying trust and culture […] require a conscious choice of proxy indicators to measure them. The indicators may not fully capture what needs to be assessed and could be situational. Decision-makers should understand the rationale and limits of those indicators. To do that, they should strengthen their knowledge of statistical methods. AI analytics is often associated with margin of error or a degree of confidence in the results. What does 90% accurate mean? How would statistics and probabilities impact corporate decisions and pricing? This goes beyond basic understanding of false positives and negatives. Statistics course refreshers can help decision-makers more confidently challenge the recommendations presented to them."

Radclyffe also touches upon the responsibility of board members in controlling the fair and sustainable application of AI technologies. He argues that **risk-management must be guaranteed by boards.** A company's board must control the "risk-levers" by closely observing AI procedures. According to Radclyffe, *"a minimum requirement would be to ensure an algorithmic model inventory is in place so that the existence and extent of AI use can be reported on."* Further, he insists that **AI results must be transparent – less by making algorithms explainable, which might be a too challenging task – but more by ensuring that results are replicable**.

In this context, Naomi Climer emphasises that the entire process of AI-based decision-making must be checked for "equality, fairness, accountability, sustainability, transparency, and data protection" by thorough auditing procedures. Further, any detected flaws must be acted on quickly to not inadvertently produce biased results. For this reason, experts must regularly check if the AI tools can produce purposeful results. Climer explains:

"It's essential to take actions based on the audit findings, to mitigate any issues emerging. For example, in the Institute for the Future of Work's study on the use of AI in hiring[3], it was common to find examples of where under-represented groups were being systematically rejected by the AI, amplifying the bias that had been evident in the system historically. It was surprising how often these biases were identified in audit, but the system was still implemented. In the case of investment decisions, similar AI issues could lead to outcomes such as consistent underinvestment in under-represented groups.)"

The far-reaching potential impact of the applied technologies on society should be

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[3] https://www.ifow.org/publications/2020/4/27/artificial-intelligence-in-hiring-assessing-impacts-on-equality

anticipated by their developers. According to Radclyffe, such considerations constitute an important part of 'digital ethics' and are an indispensable part of a company's good governance.

The importance of considering the wider societal implications of AI-based decision-making when discussing ethical principles and codes of practice is also addressed in a recent report on corporate advisory published by the ICAEW. **'Ethical practices', say the authors, ;have to be developed in the context of much wider and deeper questions of moral philosophy, politics and public policy – and questions about social norms and established economic systems.**'[4] In the Evidence Meeting, Radclyffe argues that, ideally, companies would establish independent oversight, that would control operations and build a feedback loop from stakeholders, and in doing so embed clear principles for a company's AI-driven operations.

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[4] Shaun Beaney and Rosanna Woods (2019): *AI in Corporate Advisory: investment, M&A and transaction Services*, ICAEW, p.23.

3. Responsible innovation

The question of how to encourage responsible application of AI-driven technologies without impeding innovation has been at the centre of various best-practice guidelines and corporate reports in recent years. Amongst others, there are the ICO's AI Auditing Framework[5], PwC's *Guide to Responsible AI*[6], and HSBC's *Principles for the Ethical Use of Big Data and AI*[7]. Further, the UK government founded the Centre for Data Ethics & Innovation in 2018. It connects stakeholders and experts from different sectors to help inform regulation of data-driven technologies.[8]

A major theme that emerged from the evidence provided during this session **was the importance of maintaining public trust**. David Petrie emphasises **that ICAEW calls for 'responsible innovation' by companies, financiers, and corporate advisers to ensure that such innovation is trusted by businesses** – and by the general public. Sanu de Lima, Deputy Director for Corporate Governance, Responsibility & Diversity in the Department for Business, Energy & Industrial Strategy, **calls for the application of AI "in line with an ethical code"** in order "to maintain trust for the ultimate benefit of corporate governance and corporate decision-making and furthermore for the benefit of business and investment."

To guarantee a consistent approach to the ethical implementation of AI technologies and an efficient use of resources, Christine Chow recommends **that "companies should map out a group AI footprint and an inventory of algorithmic models, with board oversight for AI governance.** […] Companies should publish AI principles that reflect business strategy, demonstrating to stakeholders their commitment to be transparent and accountable when using big data and AI." Likewise, Jan Chan emphasises **that trust in AI could be enhanced by robust testing strategies of machine learning (ML) algorithms and associated procedures**. However, it should not be forgotten that **the quality of the results is reliant on the quality of the data provided**. For this reason, data scientists should be prepared to challenge their own results. This in turn depends on their ability to understand and clean the data. Ideally, such **procedures data management**

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[5] https://www.pwc.com/gx/en/issues/data-and-analytics/artificial-intelligence/what-is-responsible-ai/responsible-ai-practical-guide.pdf
[6] https://www.pwc.com/gx/en/issues/data-and-analytics/artificial-intelligence/what-is-responsible-ai/responsible-ai-practical-guide.pdf
[7] file:///C:/Users/DesireeRemmert/Downloads/200210-hsbc-principles-for-the-ethical-use-of-big-data-and-ai%20(1).pdf
[8] https://www.gov.uk/government/organisations/centre-for-data-ethics-and-innovation

processes would be peer reviewed.

Zoe Webster points to the large set of skills that are needed to operationalise AI successfully. She notes that **the implementation of AI in a business does not only require technological understanding, but also "demands knowledge and expertise in areas such as design, social sciences and the humanities** to ensure AI innovation and deployment is effective for the business and responsible". To guarantee a sufficient supply of talent to develop and operate AI technologies, **government must incentivise international students to stay in the UK after having completed their degrees**. Chan suggests that the government should also facilitate the hiring of furloughed and self-employed AI experts in the aftermath of the Covid-19 crisis.

Sanu de Lima concludes that if the UK wants to move forward on the basis of supporting business growth and competitiveness, the governance of AI technologies should be at the centre of public-policy discussions **– "*the policy challenge has to be maintaining accountability, transparency, and ultimately trust*."**

4. Suggestions for policymakers and industry leaders

From the evidence provided in this session, it emerges that the successful deployment of AI-technologies in corporate decision-making and investment depends on an **efficient and coherent AI strategy** that includes all phases, from implementing to scaling, as well as **regular audits** of the deployed AI technologies.

Further, **employees must be trained in the application of new AI technologies** as well as in the **accurate assessment of the results** they deliver.

Lastly, government must work with business to safeguard the **responsible use of AI technologies**, ensure the **upskilling of the workforce,** as well as **facilitating the supply of talent** through adequate policies, legal codes, and guidance.

1. Modernise oversight and auditing

Government should encourage the adoption of voluntary **professional and industry standards** that include **regular impact assessments and audits** to guarantee that **equality, fairness, accountability, sustainability, transparency, and data protection** are maintained in AI-supported corporate decision-making and investment. **Explanations about how AI-based technologies have been deployed** should be included within corporate reporting requirements.

Further, companies should publish **AI principles that reflect their respective business strategies** and that demonstrate their commitment to transparency and accountability. Specifically, corporate reporting should include an **explanation of the AI-based technologies** that have been utilised in decision-making.

Government should encourage the widespread adoption of **guidelines and standards** for the **handling and processing of data** that are used to train AI tools and to check for **inherent biases and clean appropriately** in order to guarantee trustworthy results.

2. Upskill board members and employees:

To facilitate an understanding of AI-generated results that support corporate decision-making, **knowledge of statistical methods is indispensable**. Statistics courses can help decision-makers to understand and challenge recommendations.

Further, the **responsibilities of corporate executive and non-executive directors** in overseeing a company's AI strategy should be **clearly defined**. That is, companies should map out a **group AI footprint** and an **inventory of algorithmic models** that will be overseen by their respective boards, to ensure the **consistent and efficient deployment of AI technologies**.

3. Secure talent:

The effective implementation and scaling of AI technologies in finance and professional services depends on the supply of **talent that is familiar with cutting-edge AI technologies and methods**. Government should help businesses access the **existing pool of data scientists who are currently furloughed or self-employed** due to the Covid-19 crisis. It should further incentivise **international students** in the UK to stay and work in the country.

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5. Evidence

David Petrie, Head of Corporate Finance, ICAEW

During the Covid-19 crisis, the ICAEW has been collaborating closely with the UK government, the Bank of England, the British Business Bank and the Institute's members and other organisations to develop and improve the emergency measures to get cash to companies and their employees. AI-based technologies have already been utilised in that context. But thinking ahead to the recovery from the crisis, it is very important to carefully consider the potential benefits and risks of AI-based applications for companies, investors, advisers and our wider society.

This is a subject that my colleagues and I in the Corporate Finance Faculty researched in depth for the detailed report *AI in Corporate Advisory*, which was devised and co-authored by my colleague, Shaun Beaney, and by Rosanna Woods, Managing Director UK at Drooms. The report raised several important points, including:

- The potential for the use of AI-based technologies in corporate decision-making is unquestionable, although applications are still at an early stage.

- Corporate finance investment and transactions are a major form of business activity that have a significant impact on industrial sectors, national and regional economies, and, therefore, on broader society. In 2019, M&A accounted for nearly $4trn in global investment. In 2020, investment will certainly follow a very different pattern because of the crisis, but finance-raising, corporate rescues and turnaround investment will be vital for economic recovery.

- Machine reading and learning are already being deployed in virtual data rooms that are used throughout the M&A deal process - particularly on the legal side, for contract analysis, and in financial analysis, modelling, and scenario planning

- The greatest potential for the more widespread application of AI in the deal process is in, variously, origination, company valuation, due diligence, and all-important post-transaction integration.

- ICAEW supports 'responsible innovation' by companies, financiers, and corporate advisers. This is vital for ensuring public trust.

- Corporate finance and business investment are already heavily regulated in many countries, including the UK (by more than a dozen bodies). We recommend that corporate finance practitioners should adopt a principles-based approach that takes into account the ethical codes and protocols that have already been developed for professional services and for broader investment activity. Therefore, we do not believe that specific new regulation of AI in corporate finance is necessary.

- AI-based technologies have already been used to assess many aspects of corporate oversight and governance. For example, PwC has used AI to analyse thousands of documents in order to understand the extent to which the world's largest companies were in line with their voluntary climate-change obligations; KPMG has worked with IBM to assess strategic issues in companies, key risks and who would be responsible for them.

ICAEW suggests that guidelines for the use and application of AI in corporate decision-making and oversight by companies should:

1) Recommend appropriate and practicable levels of disclosure.
2) Include within corporate reporting requirements an explanation about how AI-based technologies have been deployed.
3) Ensure clarity about the various responsibilities of corporate executive and non-executive directors.
4) Encourage measures that boost investment and innovation in AI, rather than inadvertently hinder them.

Jan Chan, UK&I TAS Chief Innovation Officer, EY

Covid-19 will drive the need for corporates and government to make rapid evidence-based decisions, whether because of the need to act quickly or due to the tragic loss of key staff. AI cannot think for itself; It can only model the goals that we provide it. We cannot abrogate our responsibility for decision making to the machines. AI can help identify good targets for both public and private investment, simulate outcomes of various investment scenario options and optimise the use of existing resources, for example through staff rostering schedules, and logistics challenges.

AI is sometimes feared as a risk to jobs, but in the current situation, we have the opportunity to utilise AI augmented decision making, to respond quickly to urgent challenges, which will be required in order to boost the Post Covid-19 UK Economy. AI will enable us to find solutions backed up with evidenced based computational statistics.

UK has 3 of the top 10 computer science universities in the world. 45% of these courses are attended by international students. We have a fantastic opportunity to make use of these talented individuals.

To build trust, machine learning algorithms and their associated procedures will need robust testing and review along the lines of 2013 Macpherson review of quality assurance in analytical models or the US' Sox404 standards.

AI is only as good as the data provided. Data Scientists typically spend more than 50% of their time working with the data. This covers loading, cleaning and

understanding data, removing missing values, fixing dimensions, and dealing with corrupt records.

Testing AI is hard. It takes time and energy. Every data scientist must be prepared to challenge their results or better yet have them peer reviewed.

Recommendations

- Retraining the workforce in data skills to support the use of AI techniques, to help face the challenge of restoring the UK economy.

- Encouraging the best practice guidance of the Macpherson review in public sector analytical models

- Help businesses access the existing pool of data scientists who are currently furloughed or self-employed contractors.

- Incentivising international students in UK to stay.

Charles Radclyffe, Head of AI, Fidelity International

The potential for the use of AI-based technologies in corporate decision-making is promising, if still at an early stage. Nevertheless, it can be expected that the adoption of AI by many public and private agencies, including companies, may be accelerated by the Covid-19 crisis. AI technologies are hence likely to play a pivotal role in boosting public and private investment which will be crucial for a global economic – and social – recovery. It will also be vital for companies to ensure public, business and investor confidence and trust when they use AI-based technologies in their decisions about investment, capital raising and M&A.

In this evidence meeting, we would like to discuss how AI might influence critical corporate decisions, particularly those about investment at a board level. What would be the appropriate level of oversight by senior executives, advisers, investors, employees and customers? What are the potential implications for corporate governance? How can these new measures help boost investment and innovation in the UK and support the UK's competitiveness?

1) What should company directors take into consideration when deciding whether/how to implement AI-based technologies for 'augmented decision-making' about investment?
2) What are the most important corporate governance implications of the introduction of such technologies to decision-making and appropriate 'data governance'?
3) How might corporate boards and company advisers ensure the responsible implementation of AI-based technologies and 'data governance' that help

companies to make strategy, investment, and M&A decisions?

4) How can AI-based technologies be utilised to retain companies' competitiveness when the world economy recovers from the Covid-19 crisis?

There is no greater magic to how we should look at the implementation and governance of AI-based technologies, to that of computer software programmes from a generation ago. A particular mode of behaviour characterised the early days of the micro-processor pioneers which might be described as 'hacking' – a focus on the pragmatic need to get something to work, without regard for the engineering controls to allow the solution to operate robustly at scale.

What grew up over time was the need to scale capability across an organisation, the need for lone-wolf pioneers to be marshalled into an effective fighting force, and the ability for the C-suite to commission wholesale technology transformation initiatives with the confidence of knowing what the return on that investment would be from the outset. The software industry was thus professionalised, and truly today can it be said that those who create software are 'engineers'.

While the adage that every company is a technology company has been true for a decade or more (or at least ought to have been true), the coronavirus pandemic has made its veracity certain. If you are not a technology company today, then you simply do not exist; and if you have been able to somehow limp through the lockdown – your future on the other side is uncertain at best. This said, the state of our AI capability resembles those early days of software engineering. The benefits of AI are, for the most part, shrouded in mystery and here-say. Those who promote the technology point to firms such as Amazon, Google, and Facebook as exemplars of the possibilities; those who are not believers (and very often, the very same people who are responsible for the technology operations in their company) claim that their industry, their firm, their strategy marks them as somehow different and immune to the threat from Big Tech.

What is true of firms who have made the most of AI-based technologies is that they have done three things: They have recognised the long-term competitive advantage that a data-centric approach can bring, they have built the capability to deliver on this, and they have (largely) put in place the governance mechanisms to ensure the engine doesn't fall off mid-flight. Boards and investors should take note of these themes, and work to understand how to implement them in their own operations or investments. While the lack of engineering controls and governance that does exist today can be put down to the stage of maturity in the AI community, there are things from the story of software development professionalisation that can be learned from and applied to the development of AI:

Firstly, a level of risk-management should be insisted on by boards to ensure that they control the risk-levers and the appetite for risk is reflected in what happens on the ground. A minimum requirement would be to ensure an algorithmic model inventory is in place so that the existence and extent of AI use can be reported on.

Secondly, while much of the AI community concern themselves with trying to make algorithms explainable (which, may prove as futile as long-range weather forecasting), greater emphasis should be placed on ensuring that AI results are replicable. A capricious AI system can never be trusted, no matter how well the nuances of its whimsy is documented.

Thirdly, concern needs to be paid to the societal impact of technology as it is developed, implemented, through its lifecycle and when it is retired. I call this 'digital ethics', although recognise that most who talk of ethics prefer instead to seek technical standards and frameworks for controlling the data or the training and monitoring of the models themselves. A company practicing good governance of ethics will be working to establish some independent oversight of its operations at the same time as building a feedback loop from stakeholders and channelling these concerns into a process that establishes clear principles for the organisation to follow.

And finally, my call to policy-makers is to recognise the long-term inevitability of economic disruption caused from automation and AI, the medium-term impact that we are likely to see on the job market, and therefore the near-term imperative to at least plan for at least the possibility of technological unemployability. The coronavirus pandemic has demonstrated the benefits of long-term contingency planning, and while the shape of the impact of automation on the economy will be different to that we've witnessed over the last few weeks – the effects will be much longer-lasting – permanent, in fact. While I can imagine a strong political desire to satisfy demands to achieve full employment in the UK as quickly as possible, this might not be the goal most compatible with the inhabitants of these islands thriving in the long-term.

One of the inadvertent beneficiaries of the coronavirus pandemic will be Jeff Bezos and the investors in Amazon; at the cost of many hundreds or thousands of small business owners in the UK, not just those in retail – also those who use Amazon as a distribution channel. Unintentionally, Tim Berners-Lee's invention caused capital wealth to be created in the US at a faster pace than that in the UK at the same time as the UK emerging as one of the most vibrant entrepreneurial markets with an excellent base of technology skills. I believe that policy makers should encourage the investment community and particularly incentivise the pensions industry towards activity that balances capital wealth creation in the UK rather than simply job-creation here.

Dr Zoë Webster, Director – AI and Data Economy, Innovate UK

UK Research and Innovation has been engaged widely with businesses and academics to understand how we should be investing and supporting AI research and innovation given the potential economic and societal impacts. As the UK's national innovation agency, and as part of UKRI, our take on this question concerns the conditions under which business-led innovation might be enabled or accelerated through the use of AI, across sectors, and how AI innovation itself might be supported.

The impact of AI will not be limited to a single sector, or solely to the firms that develop and produce AI tools and technologies. Many sectors have started to identify and pursue specific opportunities to use AI to boost productivity in their specialised processes (e.g. to optimise manufacturing throughput) or to increase competitiveness and sales through the development of new or improved products, processes and services for the market e.g. to develop more personalised financial products.

Despite UK strengths, we are not seeing AI adoption at pace or scale more generally. As of 2017, adoption of AI by UK firms was lagging behind US and European firms. In the current outbreak, adoption of digital technologies generally, especially those for connectivity, is being accelerated but the UK still needs to boost its comparative position.

Our engagement with businesses across all sectors before the outbreak led us to conclude that many businesses, even many of the larger corporates, are not reaping the full benefit of adopting AI within their general but critical business processes, for example, business development, customer services and HR. This represents a

significant and growing market in our view, particularly, as now, there is a shift in focus to resilience on top of productivity and competitiveness. It is particularly timely given that many business leaders are now more than ever aware of which data and processes are most important to their firms, but still, bringing AI into the mix is a risk and it is one that the public sector can help to mitigate.

Through our ongoing business engagement, we have identified a number of opportunities that could unlock and accelerate AI innovation and adoption in the business setting. These include those around data, skills and responsible innovation.

Data is rarely found in neat, curated sets, or the type generally required for AI deployment. Up to 80% of the cost of an AI project is spent on 'data engineering' – obtaining the 'right' data sets, cleaning, and organising data, and arranging training and test data sets. Improving the productivity of the data engineering process, through research and innovation, would decrease the costs of AI projects and free up data scientists to focus on pressing concerns, such as understanding or accounting for embedded biases in data.

Data scientists are often the role most associated with AI. These are in high demand and short supply, attracting eye-watering salaries, putting them out of reach for many businesses. That is one issue, but another is that skills are needed to operationalise AI successfully – embedding it into a functioning business without disruption. This goes beyond pure technological understanding and demands knowledge and expertise in areas such as design, social sciences and the humanities to ensure AI innovation and deployment is effective for the business and responsible.

By responsible, we mean that AI deployment should reflect and support human and societal values, be designed for user privacy, transparency and to limit unjust or irrational bias, transparent and explainable to those it impacts and is reliable, robust, safe and secure.

There is a wealth of frameworks on ethics and the UK leads the way in this. To support businesses looking to innovate responsibly, Innovate UK has worked with the British Standards Institute to develop a Publicly Accessible Standard (numbered 440) on Responsible Innovation to provide guidance to help business leaders achieve the benefits of their innovation and to identify and avoid or mitigate any potential harms or unintended misuse. It provides a standardised approach to identification of benefits and possible harms, to weighting them, to recording them, to iterating them and to communicating them. It helps businesses to consider the impact of an innovation on the business itself, on customers and suppliers, on investors and on wider society and environment. We think this will go some way to helping corporate oversight.

Dr Christine Chow, Head of Asia and Global Emerging Markets, Hermes Investment Management

Dr Christine Chow
Head of Asia and Global Emerging Markets,
Hermes Investment Management

Global M&A volume increased from US$2 trillion a year after the Global Financial Crisis in 2009, to US$4 trillion per year between 2015 to 2019. Investments in the UK tech sector, concentrated on fintech, AI and clean energy, soared to £10.1bn (US$13.2 billion) in 2019, securing a third of the £30.4bn raised in Europe, beating Germany and France. What is attracting these funds? Besides a strong legal framework and law enforcement culture; international and diverse sources of capital, it has to do with corporate adoption of AI innovation.

According to McKinsey, AI has the potential to create up to US$6 trillion in value annually. **When it comes to corporate decision making and investment, AI can benefit businesses in three key ways:**

1) First, it helps to identify opportunities. Keyword searches and news screens identify strategic fit and funding needs that help potential acquirer building a pipeline of targets.
2) Second, AI improves due diligence insights. Regulatory technology enables near real time legal and tax compliance checks that helps to quickly establish the potential liability of a company. AI supports document management and processing for transactions. Big data led factor analysis assess intangible qualities such as corporate culture and customer trust. Location and asset level data, such as satellite images and on-site sensors help analysts collect and process data directly rather than relying on out-dated disclosure-based methods.
3) Third, AI strengthens scenario analysis. Interactive data visualisation helps

decision-makers to get pass the noise of big data and makes analytics agile.

These upsides can be captured with success if the risks are managed. Quantifying trust and culture, such as the examples I shared, require a conscious choice of proxy indicators to measure them. The indicators may not fully capture what needs to be assessed and could be situational. Decision-makers should understand the rationale and limits of those indicators. To do that, they should strengthen their knowledge of statistical methods.

AI analytics is often associated with margin of error or a degree of confidence in the results. What does 90% accurate mean? How would statistics and probabilities impact corporate decisions and pricing? This goes beyond basic understanding of false positives and negatives. Statistics course refreshers can help decision-makers more confidently challenge the recommendations presented to them.

More broadly, companies should map out group AI footprint and an inventory of algorithmic models, with board oversight for AI governance. This ensures group wide consistency and the efficient use of resources. Companies should publish AI principles that reflect business strategy, demonstrating to stakeholders its commitment to be transparent and accountable when using big data and AI.

The principles are an integral part of shaping corporate culture and conduct. Technology leaders such as IBM have been publishing ethical AI reports and use cases since 2014. HSBC published their ethical AI principles in February 2020. They marked the beginning of a journey of ethical AI integrated into business decision making at all levels, which I encourage.

Naomi Climer CBE, Co-Chair, Institute for the Future of Work

The Institute for the Future of Work is an independent charitable trust with a mission to make work better and fairer through the Fourth Industrial Revolution ('4IR'). The organisation has grown out of the Future of Work Commission[i] and is identifying and responding to Future of Work challenges driven by the impacts of technology on work at an individual, firm and systems level.

IFOW's research indicates that technology - in particular new data-driven technologies - are behind the most exciting opportunities and challenges which bear on work across the UK.

IFOW has looked at the impact of new technologies such as AI through the lens of work. It rapidly emerged that equality and fairness is a major issue around the use of AI, so IFOW has established an Equality Task Force to examine the issues. This was a deep dive into the equality principle of the Good Work Charter[ii] – IFOW's framework for good practice and policy orientation for technology developers, business, and others.

Most recently, IFOW published a research paper 'Artificial intelligence in hiring: Assessing Impacts on Equality" [iii] as well as a discussion paper 'Equality through transition' co-authored by Dr Anne-Marie Imafidon

IFOW has also produced model case studies showing the use of machine learning at work and highlighting new challenges[iv].

Main points:

It is important to be really clear about what outcome the AI is meant to achieve (purpose). This then makes it possible to check that the AI is doing what was intended.

It is essential to audit the AI to check for Equality, Fairness, Accountability, Sustainability, Transparency, and data protection. This is to check that the AI is achieving its purpose and that decisions being made are not producing inadvertently biased or unhelpful results.

It is essential to take actions based on the audit findings to mitigate any issues emerging. (For example, in IFOW's study on the use of AI in hiring, it was common to find examples of where under-represented groups were being systematically rejected by the AI, amplifying the bias that had been evident in the system historically. It was surprising how often these biases were identified in audit, but the system was still implemented. In the case of investment decisions, similar AI issues could lead to outcomes such as consistent underinvestment in under-represented groups.)

Special attention should be paid to using appropriate caution when AI is replacing headcount. It is important to retain some expert human inputs to ensure responsible and ethical innovation.

Recommendations to parliamentarians:

It is important that the following is available to support companies and promote legal compliance, good governance, and best practice in the implementation of AI:

- Legal codes and guidance

- Professional and industry standards

- Impact assessments and audits

This could be achieved with the support of a body such as the government's Centre for Data Ethics and Innovation (CDEI).

Sanu de Lima, Deputy Director, Corporate Governance, Responsibility & Diversity, Business Frameworks Directorate, Department for Business, Energy & Industrial Strategy

Sanu de Lima
Deputy Director, Corporate Governance,
Responsibility & Diversity Business Frameworks Directorate,
Department for Business, Energy and Industrial Strategy (BEIS)

I joined the Department in September 2016, I am responsible for corporate governance reform, aspects of responsible business. That is, business going beyond the rules and beyond mere compliance to be a force good in our society, and business leadership diversity responsibility, a part of this is gender and ethnic minority diversity at the top of UK business. I approach this discussion very much as a listener and a learner and I am very pleased to do so.

From a corporate governance reform perspective I am interested in how one could operationalise this further – AI but also digitalisation, in line with an ethical code because we need to maintain trust for the ultimate benefit of corporate governance and corporate decision-making and furthermore for the benefit of business and investment.

I see there are two domains of practical application in corporate governance. One of those is around high volume information analysis and how for corporates in the first instance the application of AI could be really beneficial, partly given the increased demands on public companies when it comes to corporate reporting and the number of things they have to report on. One of the other speakers mentioned for example TCFD and climate-related financial disclosures. There is a lot of complex material involved in doing that. I am thinking about the output generated by AI may well assist in corporates formulating what the inputs should be in terms of the metrics and the data. At the end of the day, they need to think about compliance, especially the

comparability of the information provided. There is a practical application for supervision and market supervision. Indeed, at the current time, with the Covid-19 situation, we are looking at increased flexibility for equity raising in the market.

It is increasingly important for market supervision to be able to monitor quick developments – for example for flexibilities for pre-emption rights in terms of raising equity. Another practical application is around audit. And then of course, there is a stewardship element to this, and the gathering of information to make important investment decisions. That information is just growing, and investors need better comparable and meaningful information in order to make fair and effective stewardship decisions.

The second area where I think is interesting application is around process and thinking about AI as a process-management tool. One area that comes to mind is around shareholder intermediation and the increasingly complex investment chain that involves proxy-voting and other decision-making bits of the investment process. I would be interested in a future application of AI that manages to streamline that and make it more cost-effective.

The last area I would like to touch on is board effectiveness and how AI might be able to analyse and inform how companies are coming to decisions. Partly around the diversity of their board and what it's made up of, but also around the process of consultation within the company with committees, with the workforce, with the stakeholders that enables better decisions to be derived at. I think for policymakers and indeed for Parliamentarians we always need to think about potential for legislation or regulatory guidance, have an impact on regulation, on business burdens of course, but also in the current time competitiveness – and international competitiveness. I am thinking about practical applications of AI from my team's point of view, we will also be thinking about the benefits for analysis, for mitigating risks, but also for risk-taking, and innovation on the part of companies and investors. Around all of that is governance of all the technology itself. Because if we move forward on the basis of supporting business growth and competitiveness the policy challenge has to be maintaining accountability, transparency, and ultimately trust.

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