



in
Corporate Advisory

INVESTMENT, M&A AND TRANSACTION SERVICES

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Foreword

This report, *AI in Corporate Advisory*, is, significantly, the first in the world to specifically address the application of artificial intelligence to corporate transactions. In 2018, M&A deals were worth \$4trn globally.

It is the result of an important initiative and unique research by ICAEW's Corporate Finance Faculty and Drooms. They were advised by an Expert Consultative Group, which I had the pleasure of chairing.

The report builds on the development of ethical principles and codes of practice for AI, including in Professor Dame Wendy Hall and Jérôme Pesenti's influential report, *Growing the Artificial Intelligence Industry in the UK*, the House of Lords Select Committee on AI's report, *AI in the UK: ready, willing and able?*, which I chaired, and, most recently, Peter Montagnon's report *Corporate Ethics in a Digital Age* for the Institute of Business Ethics.

Corporate finance is already strongly regulated in many countries, including the UK. But practitioners around the world will need to adopt new principles for the use of AI in M&A, buyouts, capital markets transactions, growth finance and other types of deals and investment.

AI in Corporate Advisory covers the practical potential of, and indeed challenges for, the use of AI in corporate transactions throughout the deal process - from origination to completion. As it explains in valuable depth, expert professional judgement will become even more important in the Age of AI.

This initiative also demonstrates the kind of collaboration between corporate advisers - including chartered accountants and lawyers, working closely with technologists and regulators - that will be needed in order to promote new professional standards, encourage best practice and create qualifications and training that will ensure trustworthy and effective use of these transformative new technologies.

I very much welcome the conclusions of this report and I look forward to seeing them take root throughout the professions engaged in corporate finance.



Lord Clement-Jones CBE

Co-Chair, All-Party Parliamentary Group on Artificial Intelligence;
Formerly Chair of the House of Lords Select Committee
on Artificial Intelligence

Introduction

‘I’m proud to announce a major new initiative by ICAEW. We’ll commission new research by an expert working group, and publish principles about the impact of AI and big data on transaction services strategy, practice development, ethics, governance, professional standards and regulatory threats and opportunities.’

Michael Izza, Chief Executive, ICAEW, 4 July 2018

On 4 July 2018, at its innovation investment conference at Chartered Accountants’ Hall in London, ICAEW announced a new initiative, led by its Corporate Finance Faculty, to assess the use of artificial intelligence (AI) and big data in corporate finance transaction services provided by major professional services and accountancy firms.¹

PURPOSE OF THE RESEARCH AND THE WHITE PAPER

AI is rapidly becoming one of the most transformative and most widespread general purpose technologies in human history.²

AI’s impact on finance and business will be profound. The Corporate Finance Faculty has been tracking the application of such technologies to ‘big data’ in corporate transactions.³ They will have a huge influence on how professional services firms advise their clients in the future. While we are unlikely to see massive changes in the next year or two in corporate finance departments, investment banks or the corporate divisions of law firms, there are likely to be big changes over the next five to ten years.

The application of AI in this way is extremely important. Corporate finance investment and transactions are a major form of business activity that has a significant impact on industry sectors, national and regional economies, and, therefore, on broader society. Corporate finance, as it is defined in countries such as the UK, includes raising start-up and venture capital, growth capital, mergers and acquisitions (M&A), management buyouts (MBOs) backed by private equity, equity capital markets and initial public offerings (IPOs), raising debt and alternative finance, capital for specialist investment funds, infrastructure investment, and turnaround finance.⁴

There is great public interest and potential economic benefit in ensuring effective and responsible corporate finance for business innovation; in order to engage with new markets, new technologies, new deals and new ventures, companies need to access equity capital, debt and alternative finance. And M&A – worth a total of \$4trn globally in 2018⁵ – is one way that companies grow and change.

1 ‘Boosting Finance for the UK’s Industrial Strategy’, ICAEW, available at icaew.com/boostingfinance

2 General purpose technologies (GPTs) are commonly defined as technologies that have had an impact across whole societies and economies, throughout history; contemporary examples in addition to AI would be genomics, nanotechnology, quantum computing, and robotics.

3 See, for example: ‘Big Data. Big Bang’, *Corporate Financier*, July/August 2016; and ‘Finely tuned’, *Corporate Financier*, May 2018.

4 See ‘What is corporate finance?’, ICAEW, icaew.com/cff

5 Data provided by Refinitiv: refinitiv.com

Expert corporate finance advice – often known internationally as ‘corporate advisory’ (particularly when it comes to large transactions) – provides the know-how that companies need so that they can adapt to changing commercial circumstances.

THE AGE OF AI

The House of Lords Select Committee on AI noted in its extensive 2018 report that there is no widely accepted definition of artificial intelligence: ‘The debate around exactly what is, and is not, artificial intelligence, would merit a study of its own.’⁶ The Select Committee settled for the very general definition used by the UK government in its Industrial Strategy (published in 2017): ‘Technologies with the ability to perform tasks that would otherwise require human intelligence, such as visual perception, speech recognition, and language translation’. The Select Committee listed commonly used AI terms, such as ‘algorithm’, ‘expert system’, ‘machine learning’, ‘neural network’ and ‘deep learning’.

Most of the current and potential applications referred to in this report utilise machine learning, a subset of AI, which is often contrasted with ‘general intelligence’. In computer science, machine learning means the development of algorithms based on the application of statistical models to large amounts of data.

Two factors have led to the widespread adoption of this technology. First, the massive increase in data from across society (hence, ‘big data’), including numbers, text, sensory information, images and video; and, second, the increasing availability and affordability of cloud-based processing in order to analyse all these different types of data at speed.

In this report, we have focused on the practical opportunities and risks arising from AI for those involved in corporate finance transactions, including advisers and their client companies and investors. We ask how AI technologies might augment the existing business models of advisory firms and, in some cases, create new business models. We have looked in depth at the UK in particular, but with a view to the potential global implications of these new technologies; and we believe that this report contains lessons for people working around the world.

Professional expertise will become more, rather than less, important in the Age of AI. Substantial productivity gains could be realised by companies – and by entire economies. But the wider benefits of AI will not be realised by simply ‘disintermediating’ human expertise, or, as it is sometimes more crudely put, by ‘taking out headcount’. Traditional forms of expertise – albeit combined with new expertise about how and when AI best aids decision-making – will remain crucial for good advice.

We hope that this report and the research we conducted will be useful for professional services firms, corporate finance specialists, companies, investment institutions, technologists and policy-makers. New technologies – including digital ones – have long been major tools in the development of the accountancy profession; finance professionals are often early adopters of new software and systems. AI will not be an exception.

We do not focus in this report primarily on ethical questions about AI. However, in Chapter 2 we have briefly summarised some of the many questions about ethics – and some of the many potential answers that have been put forward elsewhere. These questions are crucial for those who aim to be good ‘corporate citizens’. Martin Rees, the Astronomer Royal and one of Britain’s most prominent intellectuals, has called for ‘responsible innovation’ in AI by scientists.⁷ That call should also be made to companies, investors and corporate advisers.

⁶ House of Lords Select Committee on Artificial Intelligence, *AI in the UK: ready, willing and able?*, April 2018.

⁷ Martin Rees, *On the Future: Prospects for Humanity*, Princeton University Press, 2018.

For corporate transactions, we can draw upon the huge amount of work already underway on AI ethics in democratic countries, including by ICAEW. Many consortia of companies, academics, technologists and not-for-profit groups have established panels and consultative groups to discuss the subject.

THE STRUCTURE OF THIS PAPER

CHAPTER 1	CHAPTER 2	CHAPTER 3
We outline the international context of the development of AI, including the new opportunities - and potential risks - AI is creating across societies and economies.	We consider questions of ethics, regulation and the new protocols that are now being developed in business and finance.	We assess the rapid introduction of AI-based applications in professional services, focusing on accountancy and law.
CHAPTER 4	CHAPTER 5	CHAPTER 6
We look in depth at how AI could be applied to corporate advisory (generally known in the UK and some other countries as 'corporate finance') to support decision-making and risk management in major M&A, company investment and capital markets transactions.	We assess some of the venture investment made so far by professional services groups in nascent AI-based technologies.	We make a few, tentative predictions about how corporate advisory might develop over the next few years, as AI becomes much more significant. We also suggest what that could mean for those organisations, including ICAEW, that provide professional qualifications, training and CPD support.

Our conclusions, listed in each chapter and summarised below as 'Research findings and recommendations' on pages 9-12, are in general positive about the prospects for the use of AI when combined in a structured, sophisticated way with corporate finance expertise, judgement and collaboration.

COLLABORATION BY ICAEW AND DROOMS

This project is the product of a collaboration between ICAEW's Corporate Finance Faculty and Drooms, which has significant technology expertise in the application of AI, based on providing more than 25,000 organisations around the world with highly sophisticated and secure virtual data-room technology (see 'The changing role of virtual data rooms', Chapter 4).

ACKNOWLEDGEMENTS

We have included a detailed list of the many participants in this project on page 57.

To inform this project, ICAEW's Corporate Finance Faculty and Drooms convened an Expert Consultative Group that included many of those who are leading the development of AI-based services and applications within major professional services organisations.

We would like to thank the members of the group for sharing their expertise and taking time to make a crucial contribution to this project. Lord Clement-Jones CBE, a leading UK parliamentarian on AI and also a member of the board of the Corporate Finance Faculty, chaired the group, which also included Joseph Altendorff, Professor Birgitte Andersen, Oliver Bethell, Euan Cameron, Edward Chan, Jan Chan, Pete Dawson, Matthew Howard, Katerina Joannou, Derek Neil, David Petrie, Shamus Rae, Leonora Staines and Jonathan Stubbings.

We would also like to thank Yvette Allen and Duncan Skales for taking time to review the report, and Stephen Hennigan, Government Policy Adviser at the Office for Artificial Intelligence, who has been very helpful indeed.

Thank you to our many colleagues at ICAEW and, in particular, to Robert Hodgkinson, Richard Anning, Sophie Falcon and Kirstin Gillon, as well as David Petrie and Katerina Joannou in the Institute's Corporate Finance Faculty, and, at Drooms, Alexandre Grellier, Petter Made and Leonora Staines.

Vicky Meek has been crucial for the report as its research editor, conducting in-depth interviews with experts. Luke von Kotze's sharp-eyed editing of the report has been much appreciated.

Finally, thank you to the many member organisations of the Corporate Finance Faculty that are in business, advisory and investment and that support and contribute to its work - including this project.

3 July 2019



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Research findings and recommendations

AI IN A GLOBAL CONTEXT (CHAPTER 1)

SIGNIFICANT FINDINGS



AI-based technologies are forecast to have a significant impact on the global economy by 2030.

Some economic sectors, such as financial services, medical diagnostics, genomics, drug discovery and cyber security, are already being rapidly changed by the introduction of AI-based technologies.

Many countries are investing significant expertise and capital into the development of AI. For example, the UK government's Industrial Strategy aimed to significantly step up research and development in AI in order to boost economic productivity.

Pattern recognition techniques are already being widely trialled in 'lawtech', where they can be applied in particular to highly structured documentation.

The use of new technologies - including digital ones - has long been central to the way that the accountancy profession has developed; finance professionals are often early adopters of new software and systems. AI will not be an exception.

AI represents a threat to some traditional activities in professional services, but it also provides opportunities for new services and for employment to be augmented by AI, particularly where much broader intelligence, expertise and complex interaction are required.



RECOMMENDATION





In a global AI market dominated by the US and China, countries such as the UK will need to increase public and private investment sharply and may well need to create new forums for international R&D collaboration in economic sectors such as professional services.

Research findings and recommendations


ETHICS, REGULATION AND PROGRESS (CHAPTER 2)

SIGNIFICANT FINDINGS 	AI offers many potential benefits to humanity - including social, economic and business benefits - but it also creates new, significant risks.
	There are many encouraging international initiatives underway, particularly involving democratic countries, to create ethical codes and protocols for the safe and collaborative development of AI.
	Expert professional judgement will become even more, rather than less, important in the age of AI.
RECOMMENDATIONS 	Specific new regulatory measures for AI in corporate advisory are unnecessary; in the UK, for example, corporate finance is already strongly regulated by several government departments, governmental agencies and professional bodies. But corporate finance practitioners should adopt a principles-based approach that takes into account the ethical codes and protocols developed for professional services and broader investment activity.
	Development work on ethics by ICAEW, and in closely related professions, such as law, banking and private equity, should be taken into consideration in corporate finance. This work should include the potential adaptation and/or extension of the Corporate Finance Faculty's Principles of Professional Conduct to include AI and big data.


THE AI CONTEXT FOR PROFESSIONAL SERVICES (CHAPTER 3)

SIGNIFICANT FINDINGS 	Professional services firms, including accountancy firms, are at the heart of the knowledge economy. They have access to the expertise, techniques and volume of data needed to develop and use AI applications in order to help their clients.
	One very important example of professional judgement is in deciding how much data it is necessary - or expected - to disclose to other parties involved in a corporate deal.
	The application of 'lawtech' (or 'legaltech') to document management, analysis and processing is a highly competitive sector of AI, and it has already attracted substantial corporate and venture capital investment and stimulated collaboration between professional services firms.
	Professional services firms, including the largest accountancy firms, are using AI-based technology not only to redevelop existing services but also to provide clients with new services.
RECOMMENDATION 	Collaboration between professional services firms and technology developers in AI and big data should be stepped up. However, the role of professional expertise and judgement will remain essential for public and business confidence, and will not simply be 'disintermediated' by technology platforms.

AI IN CORPORATE TRANSACTIONS - WHAT'S THE POTENTIAL? (CHAPTER 4)

SIGNIFICANT FINDINGS 	<p>AI-based technologies will have a marked impact on the global M&A market over the next decade - a market worth \$4trn and accounting for more than 50,855 corporate transactions in 2018.⁸</p>
	<p>Experts we interviewed for this report rated, on average, the likely significance of AI for corporate transactions as 9/10 - but their own organisations' level of AI adoption in corporate advisory at the moment as only 4/10; while they rated their clients' level of adoption for corporate transactions as 3/10.</p>
	<p>As corporate advisory services become more sophisticated - and those provided by major firms more diverse - the potential for AI increases.</p>
	<p>The greatest potential for AI in the deal process is in origination, company valuation, due diligence and post-transaction integration and reorganisation of businesses.</p>
	<p>The application of AI to transaction services could make the due diligence process faster, more accurate and more insightful - reducing risk for all parties involved.</p>
	<p>Providers of virtual data rooms (VDRs), such as Drooms, are rapidly expanding and deepening the services they provide; they are already utilising AI-based technology - with predictive analytics set to be their next big breakthrough area.</p>
RECOMMENDATION 	<p>Major professional services firms and professional organisations, such as ICAEW, should publicise the potential benefits of AI-based technologies for corporate transactions, when combined with professional expertise. These benefits include faster, more accurate and more insightful due diligence processes.</p>

INVESTMENT IN CORPORATE ADVISORY AND PROFESSIONAL SERVICES (CHAPTER 5)



SIGNIFICANT FINDINGS 	<p>Venture capital investment in AI-related businesses is growing rapidly across the world; in the UK, it has totalled £3.3bn since 2011, picking up from a very low base; in 2018, it topped £1bn annually for the first time.⁹</p>
	<p>Governments around the world will need to increase their own investment in AI in order to boost private investment, and to remain competitive with the AI 'superpowers' - the US and China.</p>
	<p>Major professional services firms are investing in a number of ways, including in internal projects, incubators, inter-firm collaboration, and venture investments - although many of these initiatives are still at a relatively experimental stage.</p>
RECOMMENDATION 	<p>Initiatives such as the UK's £20m Next Generation Services pioneer programme, part of the government's Industrial Strategy Challenge Fund, should be expanded to help them work as catalysts for further innovation and private-sector investment.</p>

⁸ Data provided by Refinitiv: refinitiv.com

⁹ Data provided by Beauhurst: beauhurst.com

Research findings and recommendations

CORPORATE ADVISORY IN THE 2020S (CHAPTER 6)

<p>SIGNIFICANT FINDINGS</p> 	<p>Clients are demanding ever more speed, depth and sophistication in corporate advisory services.</p> <p>Public concern about the application of AI to major corporate transactions – which are, after all, deals that can change whole economies and affect whole societies – is understandable. But at the same time, the core ethics, standards, expertise and skills of the professionals who advise on such transactions ought to be beneficial for all.</p> <p>An important question in business is how AI-based technologies can add value to companies, investors, advisers and broader society, including the economy.</p> <p>In the short to medium term, we are unlikely to see radical new business models for those who advise on corporate transactions. We will instead see exciting and innovative new collaborations and combinations of professional advisers, consultants, technologists and corporate and investment clients.</p>
<p>RECOMMENDATIONS</p> 	<p>Professional bodies such as ICAEW should continue to collaborate with other organisations, governments and regulators to encourage the development of best practice and the highest possible standards – and therefore trust – in the application of AI to corporate transactions.</p> <p>Enhancing qualifications, training and CPD – including ICAEW’s ACA and its Diploma in Corporate Finance – to help professionals combine their corporate finance expertise with technological competence is a competitive necessity for professional organisations and academic institutions.</p> <p>Areas for potential future research about AI in corporate advisory include: how corporate transaction processes are changing; how principles and codes of conduct should be adapted; how bodies such as ICAEW could play a role in testing and verifying AI-based technologies; how core qualifications could incorporate AI; and what potential new career paths and opportunities AI could create for people from all backgrounds.</p>

Chapter 1

AI in a global context

‘Global investment in AI is growing rapidly, and it’s an extremely competitive sphere. The UK has to be very targeted in our national strategy. We’ve so far played a strong role in “trusted AI”. It’s important that we build on this.’

Lord Clement-Jones CBE, Co-Chair of the All-Party Parliamentary Group on Artificial Intelligence

\$15.7trn

AI's potential boost to global GDP by 2030

Source: PwC, *Sizing the prize: What's the real value of AI for your business and how can you capitalise?*, 2017.

\$118.6bn

Forecast annual
AI software sales
worldwide
by 2025

\$150bn

Potential value
of AI industry
in China
by 2030

£232bn

AI's addition to the UK's
economy in 2030

Source: Tractica

Sources: China's national development plan. Emily Feng, 'China's unchecked expansion of data-powered AI raises civic concerns', *Financial Times*, 25 April 2019.

Source: PwC, *The economic impact of artificial intelligence on the UK economy*, June 2017.

THE INTERNATIONAL AND UK POTENTIAL OF AI

Many of us will already be familiar with the application of AI,¹⁰ including machine learning, in commonplace online search applications, recommendation engines, navigation tools, virtual assistants, recruitment platforms and dating apps. In business and finance, such know-how is already being applied by financial institutions to fraud detection and money laundering.¹¹ The ambition of major technology companies to test AI in many more areas of life was exemplified by the recent trial of IBM Watson with an English non-league football club to analyse matches and how players performed.¹²

AI as a 'general purpose technology' (GPT),¹³ utilised by human expertise and labour, will change not only what organisations already do, but also what they could do and how they do it. This could boost economic productivity – and have a transformative effect on many organisations, including businesses.

Anand Rao, PwC's global leader for AI, and innovation lead in its US analytics practice, says that AI has the potential to increase worldwide GDP by 14% by 2030, an infusion of \$15.7trn into the global economy.¹⁴

¹⁰ See the notes about the definition of AI in the introduction to this paper on page 6, and in 'Why AI?' on page 18.

¹¹ For examples of anti-money laundering, see for example, Paul Daugherty and James Wilson's anecdote of a large global bank developing advanced analytical tools to aid its expert staff, cited by them in Chapter 2 of *Human + Machine: reimagining work in the age of AI*, Harvard Business School Press, 2018.

¹² 'The Tanners partnered with IBM for film charting use of AI at club', *Surrey Comet* (web), 8 May 2019

¹³ Commonly defined as technologies that have had an impact across whole societies and economies, throughout history.

¹⁴ Anand Rao, 'Is AI the next frontier for national competitive advantage?', *strategy+business* (blog), 22 January 2019.

Many countries, including the UK, have already published national AI strategies. On a national level, PwC has previously forecast that AI could add about 10% or £232bn to the UK's economy by 2030.¹⁵ In an official review for the UK government, published in October 2017, *Growing the Artificial Intelligence Industry in the UK*, the authors, including Professor Dame Wendy Hall and Jérôme Pesenti, described Britain as among the world leaders in developing AI technologies.

But how will countries such as the UK remain competitive in a global AI market currently dominated by the US and China? The government's Industrial Strategy is part of the answer because it aims to significantly step up research and development in AI to boost economic productivity. However, the UK will need to increase public and private investment even more markedly. It will also have to create new forums for international R&D collaboration, particularly when it leaves the EU.

Interviewed for this report, Lord Clement-Jones CBE, Co-Chair of the All-Party Parliamentary Group on Artificial Intelligence and author of the House of Lords Select Committee report on AI,¹⁶ was forthright about the challenge facing the country: 'The UK's investment in AI is peanuts versus Silicon Valley and China, so we have to be highly targeted in our national strategy. Healthcare and fintech are clearly crucial areas for the UK, but we also have a strong role to play in "trusted AI". It's important that we build on this.'

'The distractions of Brexit may make it seem that the UK is doing little else, but it is surprising how much progress we are making in AI. The recent launch of the two-year strategy by the Centre for Data Ethics and Innovation demonstrates this. No other country has such a body in place.'

The US and China do look set to dominate the global AI market - the US because of its scale, sophistication and access to public and private investment, and China because of its 'mobile-first' landscape and huge government programmes. There are also much lower human rights and privacy barriers - where there are any - to the Chinese government and Chinese companies when it comes to accessing personal data. As the *Financial Times* reported in April 2019, Beijing's national AI plan, implemented in 2017, could make the industry there worth more than \$150bn by 2030. The *FT's* news report focused on the potential consequences for personal liberty in the country.¹⁷

In marked contrast, Kai-fu Lee, a venture capitalist and former Apple, Microsoft and Google China senior executive, recently claimed that Europe (including the UK) would not take even a 'bronze medal' in AI, in spite of its centuries-old record of ground-breaking research.¹⁸ On the same theme, research by Andrew Snowden, a partner at accountancy firm UHY Hacker Young, showed that the UK had filed only two AI-related patents at the World Intellectual Property Office in 2018 of a total of 649. Chinese organisations filed 473 with WIPO; Baidu alone has filed 183 patents.¹⁹

However, there is great potential for international cooperation, as well as rivalry, in AI research and expertise, and in its application to investment, M&A and capital markets.²⁰

¹⁵ PwC press release, 28 June 2017.

¹⁶ House of Lords Select Committee on Artificial Intelligence, *AI in the UK: ready, willing and able?*, April 2018.

¹⁷ 'China's unchecked expansion of data-powered AI raises civic concerns', *Financial Times*, 25 April 2019.

¹⁸ 'Kai-fu Lee: No hope for Europe's artificial intelligence sector', interview by Carly Minsky, *sifted* (web), 14 December 2018.

¹⁹ 'UK businesses struggling to keep up with AI?', *Accountancy Age*, 21 January 2019.

²⁰ See both sides of this outlined in 'New world order', *Corporate Financier*, May 2019.

AI IN BUSINESS AND FINANCE

Sceptics about AI remind us that there have been at least two ‘hype cycles’ in the past 50 years.²¹ John Thornhill has warned in the *Financial Times*: ‘Talk to most AI experts these days and they will roll their eyes about some of the more excitable claims made about the technology. They ridicule the ‘artificial AI’ being sold to befuddled corporate bosses and gullible investors.’²²

Market intelligence agency Tractica forecasts that annual worldwide AI software revenues will grow from \$9.5bn in 2018 to \$118.6bn in 2025.²³ The scale of investment by governments and businesses across the world in AI for financial services, medical diagnostics, drug discovery and cyber security means that this time we are probably well beyond mere hype.

AI-based applications, including machine learning and natural language processing (NLP), are increasing in importance across society. For example, the Law Society in the UK has been leading several projects to develop the application of emerging technologies (often known as ‘lawtech’ or ‘legaltech’) to improve access to justice and advice. It has also been looking at the potential implications of AI for human rights.²⁴

Many corporate financiers might have first paid serious attention to AI when London-based company DeepMind, within only a few years, went from being a venture-backed start-up to its acquisition by Google in 2014, reported to be worth at least £400m. The company is now on the brink of launching its first commercial applications – to diagnose eye diseases. AI has already been the subject of significant private investment and corporate deal activity. For example, Microsoft bought SwiftKey for a rumoured \$250m in 2016, in part at least for the predictive AI that sat behind SwiftKey’s virtual keyboard app. More recently, London-based drug discovery start-up BenevolentAI has been valued at more than \$1bn.

Financial services (and attendant ‘fintech’) have attracted a lot of corporate and start-up investment – particularly in open banking, personalised financial services, fraud detection and anti-money laundering, and, in the back office, process automation. According to Mark Carney, Governor of the Bank of England, banking is the second-biggest global spender on AI systems after retail and is expected to invest a further \$10bn on AI in 2019 and 2020.²⁵ Carney pointed to the use of AI in fraud detection, automated threat intelligence and prevention, credit assessments, wholesale loan underwriting and trading. He also said that the use of such technology could make it easier for smaller companies to access finance.

In business and finance, a lot more AI is on the way. A recent survey of UK organisations by Deloitte for its *Digital Disruption Index* found that 44% had invested in some form of AI (whether by developing their own applications or acquiring technology with AI ‘baked in’), and 81% expect to have invested in AI by the end of 2020.²⁶ Quantumblack, a data analytics subsidiary of management consultancy McKinsey, reckoned that British companies that adopt AI could increase their economic value by 120% by 2030 – and in doing so boost the country’s GDP by 22%.²⁷

21 See for example, Oscar Schwartz, “The discourse is unhinged”: how the media gets AI alarmingly wrong’, *The Guardian*, 25 July 2018.

22 John Thornhill, ‘Hype about artificial intelligence brings policy benefits’, *Financial Times*, 4 December 2018.

23 tractica.com/research/artificial-intelligence-market-forecasts

24 The Technology & Law Policy Commission was convened to assess the already widespread use of algorithms in the UK’s criminal justice system. The commission was led by Christina Blacklaws, president of the Law Society, and co-commissioners Sofia Olhede and Sylvie Delacroix. It published its findings on 4 June 2019, which called for an enhanced oversight role for the Information Commissioner’s Office, a statutory code of practice for and national register of algorithms used in the justice system, and putting the Centre for Data Ethics and Innovation on a statutory footing as an independent parliamentary body.

25 Speech at the Innovate Finance Global Summit, London, 29 April 2019. Available at [bankofengland.co.uk](https://www.bankofengland.co.uk)

26 Deloitte, *Aligning Strategy, Workforce & Technology: Digital Disruption Index*, January 2019.

27 ‘AI to boost British GDP by a fifth in the next decade’, *City AM*, 10 June 2019.

Research company Beauhurst estimates that the UK already has 697 'active, ambitious' AI companies – by which it means those that are growing rapidly (including 'scale-ups'), have raised equity finance, venture debt or grants, been the subject of a buyout investment, been part of tech accelerator programmes, or been spun out from an academic institution.²⁸

TECHNOLOGY AND EMPLOYMENT

Will AI technologies augment work? Or will they replace it entirely? Will AI lay waste to many traditional jobs or create new types of employment? In May 2019, the OECD warned that governments should urgently improve education and training policies to help more people benefit from digital transformation and to reduce the risk of automation widening inequalities and driving up unemployment.²⁹

This is a particularly pressing issue for professional bodies such as ICAEW because chartered accountants and other finance professionals are often early adopters of new software and systems.

AI's effect may already be felt in a few professions. There's no doubt that some business bosses are already thinking about AI as a cost-cutter. Bloomberg was already forecasting in 2017 that robots would replace financial traders.³⁰ In February 2019, Mike Corbat, CEO of Citigroup, told the *FT* that tens of thousands of the US bank's call centre jobs were already under threat from AI.³¹ In the UK, the government's Office for National Statistics has even made gloomy predictions about accountants, suggesting that a quarter of jobs in the profession could be replaced by AI-based systems.³²

It would be naive to think that professional services firms are not considering new AI-based technologies as a way of cutting headcount, including among support staff, contractors and suppliers. Such firms have traditionally been both 'people centred' – dependent on expertise and decision-making by teams of highly knowledgeable and well remunerated staff – and also, in part, driven by the profit-per-partner metric that has been at the heart of their traditional business models.

However, Paul Daugherty, Chief Technology Officer at Accenture, and Jim Wilson, Managing Director of IT & Business Research at Accenture Research, have argued that there is a widespread misconception that AI systems will gradually replace humans in one industry after another. They predict an 'emerging symbiosis' wherein more routine, repetitive business processes are automated, but humans do what they do best – 'resolving ambiguous information, exercising judgement in difficult cases, and dealing with dissatisfied customers.'³³

A PwC economic report in 2018 forecast that: 'We estimate that [...] countervailing displacement and income effects are likely to broadly balance each other out over the next 20 years in the UK, with the share of existing jobs displaced by AI (c.20%) likely to be approximately equal to the additional jobs that are created.' The report suggested that the biggest net increases in jobs in the long run would be in health (+22%), professional, scientific and technical services (+16%) and education (+6%). The sectors estimated to see the largest net long-term decrease in jobs due to AI include manufacturing (-25%), transport and storage (-22%) and public administration (-18%).³⁴

28 Beauhurst, *The AI Brief*, 6 June 2019.

29 *OECD Skills Outlook 2019: thriving in a digital world*, 9 May 2019; for a succinct overview of some of the recent research about new technology and employment, see Hettie O'Brien, 'The automation delusion: why robots aren't the biggest threat to your job', *New Statesman*, 10 May 2019.

30 'Robots are coming for these Wall Street jobs', *Bloomberg* (online), 18 October 2017.

31 'Citigroup CEO says machines could cut thousands of call centre jobs', *Financial Times*, 18 February 2019.

32 'Robots to replace quarter of accountancy jobs in England', *Economia*, 26 March 2019.

33 PR Daugherty and HJ Wilson, *Human + Machine: reimagining work in the age of AI*, Harvard Business School Press, 2018.

34 PwC, *UK Economic Outlook*, July 2018.

Why AI?

'AI' is the term used for technology that can approximate some aspects of human learning, reasoning, problem solving, planning and self-correcting. It includes pattern recognition, predictive analytics and aspects of complex decision-making. In some cases it can also include technologies using vision and image processing, or natural language processing (NLP) - and possibly even 'smart robots'.

The new wave of development has seen 'deep learning', which is based on neural networks, applied to huge swathes of personal and consumer data available on the internet and other platforms. The application of machine learning to 'big data' has become relatively commonplace in a matter of just a few years.

Meanwhile, NLP is already being applied in widespread popular applications, including digital assistants such as Siri, chatbots and recommendation engines. However, while such advances are impressive, applying NLP in a professional setting is often more challenging; for example, efforts to apply NLP to complex documents, such as those in legal drafting, must deal with their technically specific language and long clauses. NLP also requires a system to be 'trained', using hundreds of thousands of documents - something that technology developers may find hard to access unless they work closely, for example, with law firms and the law firms' clients.

Interviewed for this report, Edward Chan, a banking partner at international law firm Linklaters, who is heavily involved in AI initiatives there, explained that pattern recognition techniques are more common in products created for the legal sector - particularly those that deal with highly structured documentation, such as leases, loan agreements and share purchase agreements, documentation that it may also be easier to standardise.

'For this to work, you need hundreds of thousands of legal documents. Only law firms and their largest clients have these. That's why we're seeing fewer developments in NLP and more focus on pattern recognition,' he said. 'Pattern recognition can go a long way to achieving this in some circumstances, but you do need a legal expert to train the system and you need a pattern of some sort, so that means the type of document this would apply to is often limited.' However, future developments in NLP could overcome this limitation.

At a more basic level, many people hope that, for example, AI-based technologies could be used to provide legal services to individuals and smaller organisations that may not otherwise be able to access them, a process described rather cheekily by innovation think-tank Nesta: 'RoboLawyers make legal services cheap and cheerful'.³⁵

³⁵ Nesta, 'Ten predictions for 2019' (web), 3 December 2018.

In the short term, there has been an increase in demand for technological expertise. There has even been concern that in the UK, for example, the private sector will swallow up AI experts so quickly there will be few appropriately skilled individuals available to work in government and the wider public sector, including in cyber security.

In an effort to address this, in January 2019 the UK's Chancellor of the Exchequer Philip Hammond announced £100m funding for 1,000 PhD places to research AI. The country also plans to provide for 200 Masters in AI places, partly backed by DeepMind and BAE Systems. To put this level of investment in context, MIT in the US announced in October 2018 that it was investing \$1bn on a new AI college.³⁶

RECOMMENDATION

In a global AI market dominated by the US and China, countries such as the UK will need to increase public and private investment sharply and may well need to create new forums for international R&D collaboration in economic sectors such as professional services.

³⁶ 'MIT plans college for artificial intelligence, backed by \$1 billion', *New York Times*, 15 October 2018.

Chapter 2

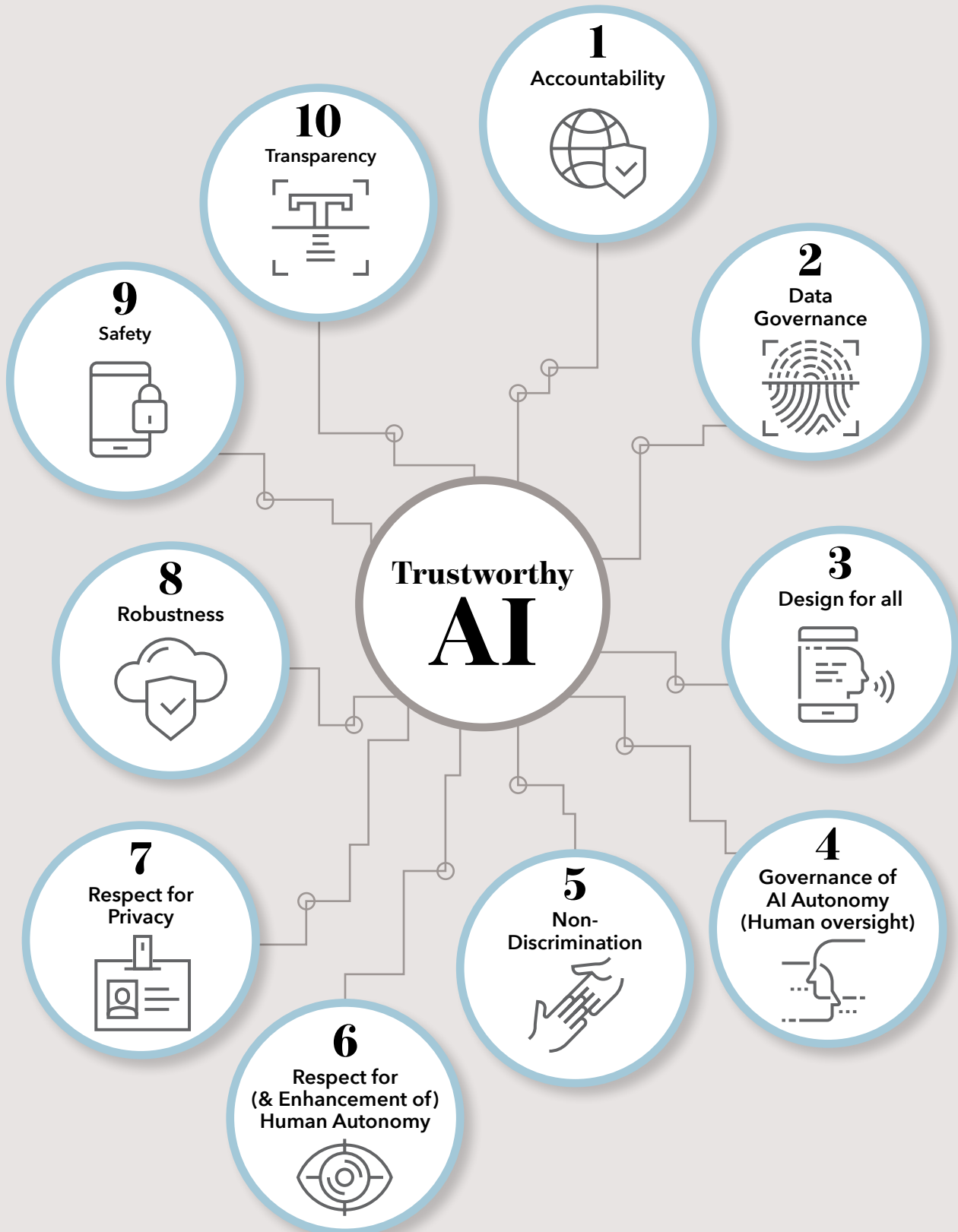
Ethics, regulation and progress

‘Organisations such as ICAEW need to be thought-leaders in ethics and regulation – moving frontiers rather than doing the heavy lifting.’

Professor Birgitte Andersen, Chief Executive, Big Innovation Centre

WHAT'S NEEDED

The European Commission's High-Level Expert Group on Artificial Intelligence listed ten requirements for trustworthy AI in its December 2018 report *Draft Ethics Guidelines for Trustworthy AI*:



ETHICAL CONSIDERATIONS

Predictions about AI range from utopian dreams to extreme pessimism. Entertaining and thoughtful takes on the subject, such as the TV series *Humans* and *Black Mirror*, and Ian McEwan's new novel *Machines Like Me* are – like their forerunner, Mary Shelley's superb novel *Frankenstein* – as much about people as they are about the 'artificial'. But for all of us, there is a lot at stake.

Martin Rees, the Astronomer Royal and one of Britain's most prominent intellectuals, describes AI, along with biotech, cybertech and robotics, as exposing 'our ever more interconnected world to new vulnerabilities' in working patterns, national economies and international relations. But, describing himself as a 'techno-optimist', he sees AI as part of the 'most rapid "penetration" of new technology in history – and also the most fully global.' Rees highlights its potential benefits in education, healthcare, agriculture, and broader technology.³⁷

AI could even play a role in meeting global challenges such as climate change (although big-data processing and storage are themselves massive consumers of energy). On the left of the political spectrum, imaginative thinkers, such as Paul Mason, see AI not only as a big threat (for example, because it increases asymmetries of knowledge and power), but also as a 'tool that liberates humanity' because of its many socially useful applications.³⁸

However, Jaan Tallinn, founding engineer of Skype and Kazaa and co-founder of the Centre for the Study of Existential Risk at Cambridge University (with Huw Price and Martin Rees), argues that on micro and global levels we all have to ensure that 'superintelligence' is safe for humanity: 'We have to think a few steps ahead. Creating an AI that doesn't share our interests would be a horrible mistake.'³⁹

On an even more pessimistic note, even CB Insights, a US media company that champions venture capital and high-tech, has warned: 'How AI Will Go Out Of Control According To 52 Experts'.⁴⁰

Some particular risks are already becoming much more apparent in the financial sector. For example, in November 2018, Risk.net reported that global investment manager BlackRock had suspended AI-based liquidity-risk models because the quantitative analysts who had developed them could not explain how they worked to their bosses. This raised the question of whether fiduciary duty to clients could be met if the AI-based decision-making processes were unclear.⁴¹

As Rees explains: 'AI must have a "goal", but what is really difficult to instil is "common sense". AI should not pursue its goal obsessively and should be prepared to desist from its efforts rather than violating ethical norms.' He warns that 'tensions may emerge when AI moves from the research and development phase to being a potentially massive money-spinner for global companies.'⁴²

37 Martin Rees, *On the Future: Prospects for Humanity*, Princeton University Press, 2018.

38 Paul Mason, *Clear Bright Future: a radical defence of the human being*, Allen Lane, 2019.

39 Quoted by Mara Hvistendahl in 'Can we stop AI outsmarting humanity?', *The Guardian*, 28 March 2019.

40 *cbinsights.com* (web), 19 February 2019.

41 'BlackRock shelves unexplainable AI liquidity models', *Risk.net* (web), 12 November 2018.

42 Martin Rees, *On the Future: Prospects for Humanity*, Princeton University Press, 2018.

Military, surveillance and policing applications of AI are, understandably, causing public and political concern. But deep questions about the transparency, monitoring and auditing of algorithmic decision making by governments, public services, banks, insurers or digital giants apply across the board. Critics have suggested that some developers have nevertheless adopted an ‘invest first, worry later’ approach.⁴³ A recent survey of UK companies by Deloitte for its *Digital Disruption Index* found that only 42% had any policies in place for the safe and ethical use of AI.⁴⁴

Ethical principles and codes of practice or protocols are part of the answer, of course. They are particularly important when it comes to new risks that AI may create and to the potential amplification of existing risks because of the scale of the big data to which AI is applied. But ethical practices 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.

There is a big push underway to create principles, guidelines, standards and even data ‘kite-marking’, alongside public education campaigns about the potential benefits and risks of AI and big data.⁴⁵ Recent significant international initiatives and publications on this front have included:

- IEEE’s Global Initiative on Ethics of Autonomous and Intelligent Systems, launched in November 2017;
- The creation of the Partnership on AI to Benefit People & Society by major multinational technology companies in September 2016;
- The Toronto Declaration: Protecting the rights to equality and non-discrimination in machine learning systems, 16 May 2018;
- Publication by Professor Luciano Floridi et al. of *AI4People—An Ethical Framework for a Good AI Society: Opportunities, Risks, Principles, and Recommendations*, November 2018;
- The European Commission’s High-Level Expert Group on Artificial Intelligence, formed in June 2018, produced its first report *Draft Ethics Guidelines for Trustworthy AI* in December 2018; it has announced in April 2019 an open ‘pilot’ phase to test the principles;
- OECD’s publication of Principles on Artificial Intelligence, 22 May 2019;⁴⁶ and
- The World Economic Forum’s creation of a Global Artificial Intelligence Council, announced on 29 May 2019.

THE UK EXAMPLE OF AI AND ETHICS

The UK, as a sizeable democracy with a relatively long – if not always untroubled – tradition of democracy and individual liberty, has been an important contributor to ethical questions about AI. As Lord Clement-Jones described it: ‘We have experience of it through exploring some of the negative consequences of GM [genetically modified food] and of the issues surrounding embryology. The UK is genuinely in a position to push forward ethics in AI.’

43 See for example, Carly Minsky, ‘AI ethics should be a forethought, not an afterthought’, *sifted* (web), 25 February 2019.

44 Deloitte, *Aligning Strategy, Workforce & Technology: Digital Disruption Index*, January 2019.

45 There have been so many such initiatives that the *Financial Times* commented that there is ‘a fragmented landscape of efforts that both supporters and critics agree have not yet had demonstrable outcomes beyond igniting a debate around the topic of AI and its social implications’. (‘How big tech is struggling with the ethics of AI’, *Financial Times*, 29 April 2019.)

46 The OECD’s new Principles on Artificial Intelligence, the first by governments, are intended to promote AI that is ‘innovative and trustworthy and that respects human rights and democratic values’. They were adopted by the OECD’s 36 members and six non-OECD members. China was not a signatory.

Recent UK-based initiatives and influential publications – albeit with a global outlook – have included:

- The creation of the Alan Turing Institute in 2015 as the UK’s national institute for data science and artificial intelligence, based in the British Library in London; AI was added to its formal remit in 2017;⁴⁷
- Professor Dame Wendy Hall’s and Jérôme Pesenti’s report *Growing the Artificial Intelligence Industry in the UK*, for the Department for Business, Energy & Industrial Strategy and the Department for Digital, Culture, Media & Sport, in October 2017;
- House of Lords Select Committee’s report on Artificial Intelligence, *AI in the UK: ready, willing and able?*, in April 2018;
- The All-Party Parliamentary Group on Artificial Intelligence and the Big Innovation Centre’s joint proposal for an AI Global Governance Commission, April 2018; and
- The RSA’s publication of *Artificial intelligence: real public engagement*, May 2018.

The 181-page report by the House of Lords Select Committee on Artificial Intelligence in April 2018, *AI in the UK: ready, willing and able?*, said that researchers and developers should ‘be alive to the ethical implications of their work’. The committee made many recommendations about how big data should be gathered, stored, utilised and audited. These included more ‘open data’, new practice frameworks, improved data ‘portability’ and the creation of data trusts. The committee was chaired by Lord Clement-Jones CBE (who is also a member of the board of ICAEW’s Corporate Finance Faculty). It built on some of the work of the All-Party Parliamentary Group on AI, for which the Big Innovation Centre – led by Professor Birgitte Andersen – acts as the secretariat.

The UK government has since set up an AI Council and created an Office for AI. In November 2018, the government announced the creation of a Centre for Data Ethics and Innovation (CDEI) to make recommendations to ‘maximise the benefits of data and Artificial Intelligence (AI) for our society and economy’. The centre, chaired by entrepreneur, regulator and writer Roger Taylor, announced in May 2019 two reviews – one about online targeting of individuals, and another about bias.⁴⁸

Alongside government action, many businesses have also written principles for AI. The London-based Institute of Business Ethics, whose membership includes many major multinational companies, has recommended that corporate boards should consider the application of technologies such as AI as ‘integral to their discussions on risk appetite and risk management’ in order to ensure sustainable growth and maintain public trust.⁴⁹ Meanwhile, PwC, for example, has published a *Responsible AI Framework* that is used by both the firm itself and its clients.

THE REGULATORY CONTEXT

The possibility of regulatory review – and new legislation, whether national or multilateral – is already very much ‘live’ when it comes to the application of these new technologies. For example, the normally cautious *Financial Times* led with a front page on 1 October 2018 headlined ‘Minister puts corporate abuse of “big data” on trial’, after the UK government’s business secretary Greg Clark announced a review by the Competitions & Markets Authority about how companies used personal data.

⁴⁷ Other notable UK-based collaborative and multinational academic initiatives for AI include the Ada Lovelace Institute, the Leverhulme Centre of the Future of Intelligence, and the Oxford Internet Institute.

⁴⁸ ‘The Centre for Data Ethics and Innovation calls for evidence on online targeting and bias in algorithmic decision making’, Department for Digital, Culture, Media & Sport, 17 May 2019.

⁴⁹ Peter Montagnon, *IBE Board Briefing: Corporate Ethics in a Digital Age*, Institute of Business Ethics, June 2019.

The threat of regulation has, for the time being at least, been focused on the digital giants of the US, including Amazon, Apple, Facebook, Google, IBM and Microsoft. Questions have been raised as to whether they act as a barrier to innovative, new 'challenger' ventures, and about their huge market concentration, and their financial – and even political – power to develop, acquire and manufacture core AI hardware and software.⁵⁰ The Chinese digital giants, such as Alibaba, Baidu and Tencent, could also come under more regulatory scrutiny as they expand outside of their home market, and because China is playing a bigger and bigger role in international relations, international trade and M&A, including services and high-tech.⁵¹

In its report, the House of Lords Select Committee on Artificial Intelligence called on the UK government and the Competition & Markets Authority to review the monopolisation of data by major technology companies operating in the UK.

ICAEW and new ethical considerations

ICAEW has been exploring the ethical issues associated with emerging technologies – building on its Code of Ethics for the accountancy profession, which includes the principles of integrity, objectivity, professional competence and due care, confidentiality and good professional behaviour.⁵² Emerging technologies present significant opportunities and challenges for the accountancy profession, such as those relating to the future role of professional judgement, which could become even more, rather than less, important in the Age of AI.

The Institute's Tech Faculty and its Integrity & Markets team – both part of the Technical Strategy Department – have been leading the way. In September 2019, ICAEW will be publishing a major new report, authored by Kirstin Gillon, Technical Manager in the Tech Faculty, that will include a reassessment of trust, ethical and accountability frameworks in business. It will also assess the potential role of chartered accountants in promoting such frameworks, with a view to increasing confidence about the use of general purpose technologies (GPTs), such as AI, among different groups – including the general public, policymakers, company shareholders, customers and employees.

ICAEW has already published, in April 2019, principles for the ethical use of big data in financial services – to address in particular the risk that some customers become unfairly excluded or priced out of vital markets.⁵³

ICAEW's Corporate Finance Faculty will also consider, as part of this project, AI in Corporate Advisory, whether it may need to adapt or extend its Principles of Professional Conduct to reflect the growing importance of AI and big data in augmenting professional skills, judgement and advice.⁵⁴

50 See for example, 'How Big Tech is struggling with the ethics of AI', *Financial Times*, 29 April 2019.

51 About China, international trade, high-tech and M&A, see: Jason Sinclair, 'New world order', *Corporate Financier*, May 2019.

52 See: icaew.com/ethicsandtech

53 Philippa Kelly, 'We are at the big data frontier – we're going to need some rules', *City AM*, 23 April 2019.

54 See: icaew.com/cff

The committee recommended that blanket AI-specific regulation would be inappropriate at this stage: 'We believe that existing sector-specific regulators are best placed to consider the impact on their sectors of any subsequent regulation that may be needed.'⁵⁵ The committee recommended that the Law Commission review the adequacy of existing legislation in case of a major AI-based system malfunction.

In its official response to the Select Committee report, the UK government said that industry 'should take the lead in establishing voluntary mechanisms for informing the public when artificial intelligence is being used for significant or sensitive decisions in relation to consumers.'⁵⁶ It added that if a regulatory requirement were introduced, it would be done in consultation with relevant industry bodies, businesses, regulators and government departments. The government also argued that there should not be 'an overemphasis on transparency' when it comes to algorithms, because it may deter innovation.

Many areas of potential application to professional services – including corporate finance transactions – are already strongly regulated in the UK and beyond, making specific regulation of the development and use of AI unnecessary, and a principles-based approach more beneficial to the public. Specific regulation would also be undesirable because it could inadvertently secure the market position of early market incumbents by raising barriers to new entrants. This would reduce the kind of innovation that could have much wider economic and business benefits.

The corporate finance market in the UK, for example, is already strongly regulated, including by bodies such as:

- Financial Conduct Authority
- Financial Reporting Council
- Takeover Panel
- London Stock Exchange
- NEX
- HM Treasury
- Department for Business, Energy & Industrial Strategy
- Competition Commission
- Pensions Regulator

In addition, professional bodies such as ICAEW, ICAS, the ACCA, the Law Societies of England & Wales, Northern Ireland and Scotland, the Solicitors Regulation Authority, the Institute and Faculty of Actuaries and the Council for Licensed Conveyancers all have oversight and/or regulatory responsibilities that relate to corporate advisory.

⁵⁵ House of Lords Select Committee on Artificial Intelligence, *AI in the UK: ready, willing and able?*, April 2018, page 116.

⁵⁶ Secretary of State for Business, Energy & Industrial Strategy, *Government response to House of Lords Artificial Intelligence Select Committee's Report on AI in the UK: Ready, Willing and Able?*, June 2018.

NEW APPROACHES

Many new protocols - or codes of behaviour - are already being developed that could be adopted or adapted for the purposes of corporate advisory.

Professor Birgitte Andersen, Chief Executive of the Big Innovation Centre, is heavily involved in the creation of new policies and practical approaches to AI. Interviewed for this report, Professor Andersen said it was important that such measures can be sensibly applied in practice: 'You need operational excellence in ethics, data and purpose. What you don't want is for lawyers to write hundreds of pages explaining how secure a system is, for example, only for it to be followed up with a whole load of disclaimers. The focus should be on better products and services and how they can be delivered in a sustainable way using AI first and foremost and then work back with protocols.'

RECOMMENDATIONS



Specific new regulatory measures for AI in corporate advisory are unnecessary; in the UK, for example, corporate finance is already strongly regulated by several government departments, governmental agencies and professional bodies. But corporate finance practitioners should adopt a principles-based approach that takes into account the ethical codes and protocols developed for professional services and broader investment activity.

Development work on ethics by ICAEW, and in closely related professions, such as law, banking and private equity, should be taken into consideration in corporate finance. This work should include the potential adaptation and/or extension of the Corporate Finance Faculty's Principles of Professional Conduct to include AI and big data.

Chapter 3

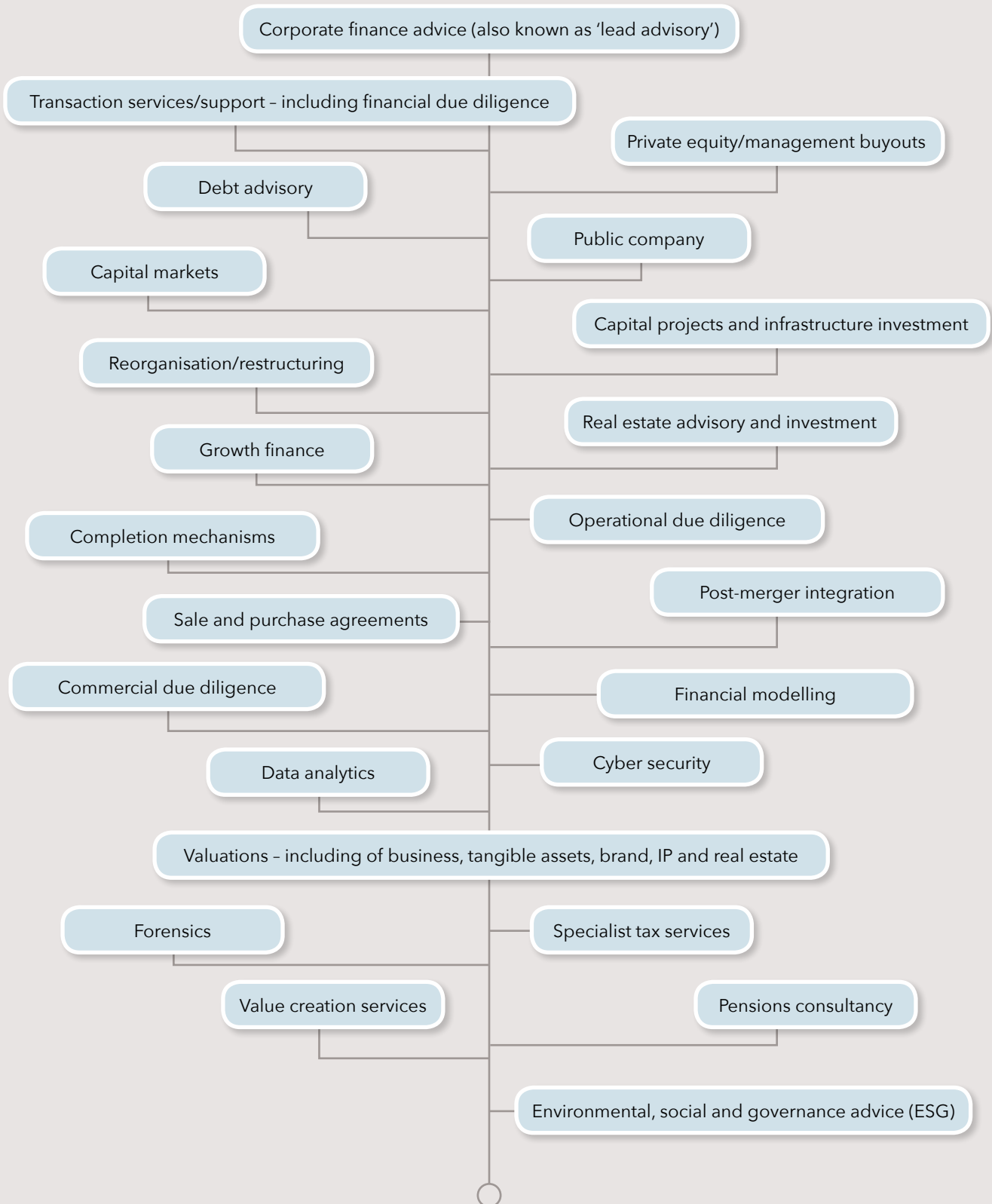
The AI context for professional services

‘AI can and should be embedded across our functions on a global basis. It should be embedded into service lines, and we should be automating repetitive processes.’

Shamus Rae, Head of Innovation, Digital Labour & Cognitive Transformation, KPMG

'ADVISORY', AI AND PROFESSIONAL SERVICES

The range and depth of specialist advice provided for corporate transactions and investment has increased markedly in the past two decades. Transaction advisory and deal advisory departments have come to play an even bigger role in professional services, with AI likely to be used in many of these niches.



Source: ICAEW Corporate Finance Faculty

THE POTENTIAL IN PROFESSIONAL SERVICES

Professional services firms have traditionally been at the forefront of the utilisation of new technology to digitise information and digitalise processes – and to augment the expertise, skills and experience of the people they employ.

Given that accountancy firms are compiling, organising, analysing and reporting on huge quantities of business and financial data, they have been at the forefront in the creation of new methodologies and technological tools for analysis. They therefore have the potential to manage and ‘mine’ such data in order to identify new trends, patterns and relationships for the benefit of their clients – including in the audit process, when those clients have given their specific consent. And the application of AI-based technology could even lead to the development of new business models.

However, increasing digitalisation and the growing use of AI will not remove the need for judgement. One example of professional judgement that remains very important is in deciding how much data it is necessary – or expected – to disclose to other parties involved in a corporate deal.

Firms will also have to be very clear about what the new technology can and cannot do. Pete Dawson, a partner at Grant Thornton, told us that there is a risk of an expectation gap developing between what the public, including clients, think the technology can deliver for them, and what it can actually do. ‘It’s a really nascent thing. That also means that, as professionals, we have to truly understand what AI does.’ As well as interpreting the results of AI, it is an important role of corporate advisers to help their clients to choose the best AI for a given task, according to Dawson.

AUTOMATING STANDARDISED PROCESSES

A central question is whether AI can be used to help to lower the cost base of many processes, including, of course, reducing the total number of people employed, but without reducing quality?

The application of ‘lawtech’ (also known as ‘legaltech’) to document management – including the processing of hundreds of thousands, or even millions of documents for disclosure or due diligence – is not new. It is already a very competitive field for start-ups, established technology vendors and developers of proprietary systems that use machine learning algorithms and natural language processing. The disclosure process can involve searching hundreds of thousands of documents in a labour-intensive, time-consuming process that can cost many millions of pounds in, for example, complex commercial litigation cases. Tech platforms are also being built for ‘smart’ legal contracts – using open-source code, and in some cases blockchain – which can then be connected with many sources of data and software systems.⁵⁷

At this stage in its development, AI still requires data that has been subject to a great deal of traditional document management – both human and automated ‘clean up’ to ensure the data has the required structure, consistency and accuracy.

Joseph Altendorff, a partner at international law firm Dentons, interviewed for this publication, explained: ‘Part of the issue for lawyers is how you deal with unstructured data. The market is still largely at the ‘Yahoo!’ stage of this. Back when Yahoo! was the dominant search engine, you were relying on good, honest people putting accurate information on files and you had to be very specific/careful about your search terms. Google changed all this, with the capacity to search using more natural-language questions, and with the range of information it made available.’

⁵⁷ See for example, accordproject.org

Engine B

Shamus Rae, Head of Innovation, Digital Labour & Cognitive Transformation at KPMG, is leading Engine B, a highly collaborative industry-led project to develop common data models (CDMs), open and available to all audit firms, technology providers and service developers.⁵⁸ These models could help companies and the professional services firms that advise them by ensuring the completeness, accuracy and clarity of any data that they need to share, for example, as part of an audit process. Rae said to the authors of this report that KPMG had already begun collecting and managing data in a very different way from the client-by-client way it did a few years ago. The firm's data management now includes a global sector-by-sector approach, with a focus on being able to use that data across AI and other technologies.

This project could also help companies to make the process smoother – and therefore less costly – when they change their advisers, such as their auditors, or when they undergo due diligence to receive investment or as an acquisition target.

Partner organisations in Engine B include major accountancy firms, law firms, management consultants, technology developers such as Microsoft and IBM, and professional bodies such as ICAEW.

Richard Anning, Head of ICAEW's Tech Faculty, put Engine B in the context of reform of the audit market. He said that, by opening up access to data, the initiative could also open up the market so that professional firms of all sizes could work for very big clients. Increased competition could benefit all businesses that use accounting services. It could also help start-ups and other new market entrants to bring innovation to the audit and accounting arena.

'ICAEW is undertaking the important role of convenor and facilitator, bringing firms together to collaborate by providing a safe space for group discussions, and potentially offering a mediation and accreditation service for the outputs of the project,' he said.

Legal document processing is already offered by many established and new technology providers. It's a business activity that is seeing rapid innovation – and new collaborations.

In 2016, in the first major collaboration between a multinational law firm and a Big Four firm, Allen & Overy launched MarginMatrix, a management and document automation service for derivatives compliance in multiple jurisdictions. It was based on A&O's proprietary technology, with Deloitte's managed services running contract negotiations.⁵⁹

Several lawtech companies have attracted large venture capital investments, particularly in North America. For example, Toronto-based Kira Systems received a \$50m investment by Insight Venture Partners in September 2018.

⁵⁸ See: engineb.com

⁵⁹ 'Taking the legal out of law: A&O launches new online derivatives offering MarginMatrix', *Legal IT* (web), 14 June 2016.

The UK is encouraging more start-ups in similar niches by providing government support alongside private investment. One such early-stage venture is Cognitiv+, which provides NLP-based contract analytics to companies and law firms in order to help them understand their compliance obligations. Innovate UK (part of UK Research & Investment) has provided the business with grant funding, while the data science team at Digital Catapult, the advanced digital technology innovation centre, has helped the company to develop new methodologies.⁶⁰

The use of AI-based technologies in law is particularly pertinent at a time when the Big Four professional services firms have been pushing hard into parts of the global market for legal services. This is especially the case in 'outsourced' legal services, where the Big Four feel they could be even quicker and more effective than the major law firms in utilising new technology.

Meanwhile, in a development of their more traditional activities, professional services firms could provide new expertise and additional services to their clients by offering them increasingly sophisticated analysis of the financial performance of their organisations, helping them to model different and more complex scenarios. Technology firms, including the likes of Amazon Web Services and Google, via its Cloud AI platform, are helping them to do this. Microsoft is working with firms in two ways, as Michael Wignall, the company's UK Chief Technology Officer, told us:

1. Focused business outcomes - collaborating with the Big Four to use the vast datasets they retain across their organisations and to take advantage of the wealth of information they can access and analyse. This includes bringing datasets together, utilising machine learning and using predictive analytics so that the firms can make better risk assessments.
2. Utilising robotic process automation (RPA) to increase efficiency and reduce headcount in laborious, straightforward manual tasks, such as transcribing data and reviewing documents. In RPA, firms are at the start of a journey.

According to Euan Cameron, UK Artificial Intelligence Lead at PwC, the firm is already utilising AI that it has developed in-house and with third-party technologists, including:

- Redeveloping existing services - for example using simulation technology to help understand the effect of certain efficiency measures within companies. This means creating models that build and test 'digital twins' of processes to make them more efficient. Another example, in data assurance, is that machine learning can be used to assess the quality of regulatory filings and to identify anomalies.
- Back office - using AI tools to improve accuracy and efficiency. For example, optimisation algorithms can be used to analyse resourcing and to match staff to jobs more effectively in audit work. For technical services, AI can also be applied to answer questions about International Financial Reporting Standards (IFRS).
- Deployment of AI for clients - this includes multiple use cases, depending on the industry in question. In business-to-consumer industries, such uses would include AI-based customer profiling, identifying demand trends and forecasting sales. Brand-new product offerings include the analysis of biometric data, using AI to help employees manage their 'wellness' and work efficiency.

⁶⁰ See: digicatapult.org.uk/case-studies/cognitiv

CORPORATE STRATEGY AND BIG DATA

Predictive analytics, utilising huge amounts of comparative data, are already commonplace in online consumer businesses, financial services and digital media. They could also play an even bigger part in professional services – and in the provision of advice to companies about corporate finance.

For corporate governance and compliance, PwC has used AI to analyse thousands of documents to understand the extent to which the world's largest companies were in line with their voluntary climate-change obligations.

KPMG has already applied such approaches to risk in banks' loan books. According to Shamus Rae, Head of Innovation, Digital Labour & Cognitive Transformation at KPMG, there have been three waves of AI development: (i) internet-based AI, such as online retailers using data to predict customer behaviour; (ii) business AI to improve corporate decision-making; and (iii) perception AI, when human perception of aural and visual cues is reproduced by AI.

The accountancy profession is currently in the second phase, said Rae. In 'business AI', for example, KPMG is working with IBM to assess the strategic issues in companies, the key risks, how to resolve or mitigate them, and who the key personnel are who would do this within the finance functions of businesses.

RECOMMENDATION



Collaboration between professional services firms and technology developers in AI and big data should be stepped up. However, the role of professional expertise and judgement will remain essential for public and business confidence, and will not simply be 'disintermediated' by technology platforms.

Chapter 4

AI in corporate transactions – what’s the potential?

‘The world is very messy and AI doesn’t operate well in a messy world. To make data valuable, you need to understand its features and engineer it in such a way that you can use it, practically. If a customer buys something, what’s the likelihood of them buying again? That’s quite easy to get at and can be useful. However, in far more complex situations – such as corporate finance – the challenge is understanding which predictors are useful and which aren’t.’

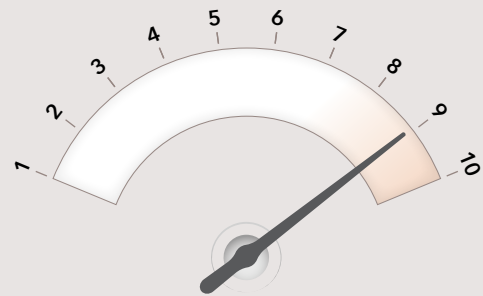
Jan Chan, Associate Partner, UK&I TAS Chief Innovation Officer, EY

PICKING UP THE PACE

For this report, we asked interviewees to rate how developed they thought AI was in corporate advisory.

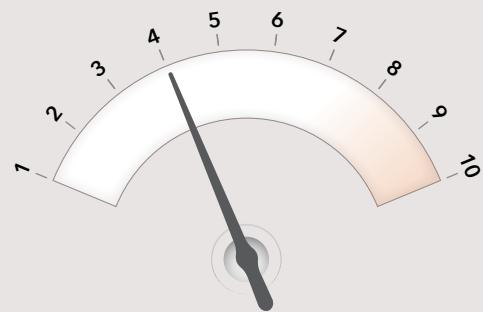
On a scale of 1 to 10 (where 1 is insignificant and 10 is very significant) how significant do you think the use of AI-based technologies will be for the **future provision of corporate advisory and transaction services** to your clients?

Average score: 9



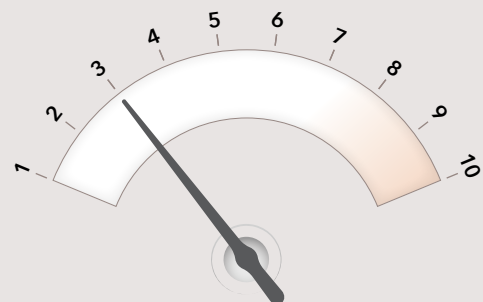
On a scale of 1 to 10 (where 1 is very early and 10 is very well developed), at what stage would you say **your own organisation is in the application of AI-based technologies** to corporate advisory and transaction services?

Average score: 4



On a scale of 1 to 10 (where 1 is very early and 10 is very well developed), what stage would you say **your corporate and investment clients** are at when it comes to the application of AI to deal-making and other corporate finance activities?

Average score: 3



Source: ICAEW Corporate Finance Faculty/Drooms, *AI in Corporate Advisory*.

THE \$4TRN GLOBAL MARKET FOR CORPORATE TRANSACTIONS

The world's market in corporate transactions - known in the UK as 'corporate finance' - is huge. The type of transactions included in ICAEW's official definition include start-up and scale-up finance, M&A, management buy-outs, capital markets transactions including IPOs, raising debt and project finance.⁶¹

Refinitiv estimates that the global market for M&A was worth a total of more than \$4trn in 2018 - and counted 50,855 deals.⁶²

There was a clear consensus among the experts we interviewed for this paper that the use of AI-based technology will be significant in the future provision of corporate advisory and transaction services (with an average score of 9/10 for its potential significance). But professional services firms that advise on corporate finance deals have a long way to go in developing their own AI capabilities (rated by our experts on average as 4/10 for current application to corporate advisory). And the gap between the potential use and the current use of AI in transactions among their corporate and investment clients is even greater (average score 3/10 for current application).

⁶¹ See 'What is corporate finance?' at icaew.com/cff

⁶² Data provided by Refinitiv: refinitiv.com

So why is AI development still at such an early stage in corporate finance – and at an earlier stage than its use in some of the other types of professional services that we outlined in Chapter 3?

The relative complexity of many large corporate transactions is one factor. This makes it difficult to standardise and replicate tasks that require human experience, judgement and collaboration.

The nature of many corporate finance deals, such as M&A, also means that they are ‘one-offs’, with the specific nature of each transaction – and the data required – again difficult to reduce to replicable processes. But advisers on such transactions could increasingly utilise data and related machine-learning techniques drawn from other business activities, such as legal contracts and management accounts.

Jan Chan, UK&I TAS Chief Innovation Officer at EY, told us: ‘In corporate finance, activity is heavily focused on data, but the issue is one of quality and standardisation. It needs a lot of work to clean it up so that it can be used in AI applications. When it’s cleaned up at source and stored and transferred with accuracy, you will see a massive shift.’ This will happen first in tax aspects of deals, according to Chan, because such information has been standardised: ‘There will be fewer grey areas. You won’t spend ages working this out and so tax will cease to be a big area of deliberation among professionals.’ But complex tax aspects of corporate transactions will continue to require specialist, expert advice.

However, Dr Mark Kennedy, Associate Professor at Imperial College Business School, argued that ‘messy’ data will remain a fact of life for a long time. Speaking to the authors of this report, he said, ‘One of the issues is that people say they can’t work with anything but clean data – I hear this all the time.’ Waiting for ‘perfect data’ is wasteful, not least because it is not always practicable or cost effective to clean it up.

Kennedy made an analogy with data about the physical features of 400 airline passengers. If a summary of those data showed exactly the same average weight for women as men, then contextual knowledge about the wider human population would suggest that there was something wrong. Using statistical techniques, it would be possible to find the errors and decide whether to fix them or instead to work around them. Kennedy said that in most business contexts, you would only do that when it mattered – for example, for reasons of safety, trust or cost.

SPECIALIST ADVISORY AND TRANSACTION SERVICES

Advisory services – particularly those provided by the Big Four professional services firms – have seen considerable diversification in the past decade as the needs of clients involved in large, complex corporate transactions have become ever more sophisticated (see ‘Advisory’, AI and professional services’, page 29).

The potential applications of AI-based technology to most of these activities are many and various. Experimental projects are already underway. For example, investment bank Goldman Sachs is reported to be automating its own IPO processes after it estimated that half the 127 steps it identified in the process could be computerised.⁶³

But other types of deal-doing, such as management buyouts, might not be so amenable to AI, as EY’s Jan Chan explained: ‘This is one of those messy places – and it’s precisely because of this that private equity can create value.’ Private equity-backed companies often lack ‘clean’ data. ‘They often don’t have the latest financial systems in place. They can be a mess of different company and ownership structures, etc. In addition, PE invests across diverse companies, so it’s not always easy to apply AI.’

⁶³ CB Insights, *Killing The I-Bank: The Disruption of Investment Banking* (online), April 2019.

AI IN THE DEAL PROCESS

Perhaps the greatest scope for short-term development is in the transaction services that support the due diligence process. AI technology is already embedded in virtual data rooms, which are widely used in transactions.

Deal origination - including corporate acquisitions

To what degree could AI-based applications be used by corporate finance advisers to source potential acquisitions, buyout targets or even potential investors on behalf of their clients?

This could be an area of rapid development because the high level of interest in the financial services sector in creating tools for institutional and private investors could see a lot of cross-over into corporate deals. There are already many digital services on the market for personal savings and investment, including those that help build portfolios of investments in private and public companies, as well as in real estate and other asset classes.

For corporate transactions, major investment banks are testing technology to find more 'buy' and 'sell' signals, including in company reports.⁶⁴ IBM's Growth & Transformation Team has been developing tools based on IBM Watson to help M&A researchers identify and analyse potential target companies rapidly and in great detail. Meanwhile, venture capitalists are rumoured to be trying out AI-boosted ways of analysing attractive start-ups.⁶⁵

Web-based match-making services - of variable quality - for buyers and sellers of small companies have been around for at least two decades. One example of a new generation of online service providers is New York-based Axial Networks, which says it is using algorithms to recommend the most relevant parties for buyers and sellers to approach by 'taking into account each buyer's and investor's real-time intent, plus the strategic and financial interests on both sides of a deal.'⁶⁶

Euan Cameron, UK Artificial Intelligence Lead at PwC, agreed that AI could eventually be used very effectively to look at past deals, identify success and failure factors, and inform the preferred characteristics of future deals. But, as he explained to us for this report, although some of the underlying technology 'building blocks' are well-developed, it would need access to enough training data to build an accurate system. At the simple end of the scale, it would already be possible to carry out what he described as 'pre-emptive diligence' by analysing publicly available information about thousands of companies before making a new private equity investment or corporate acquisition.

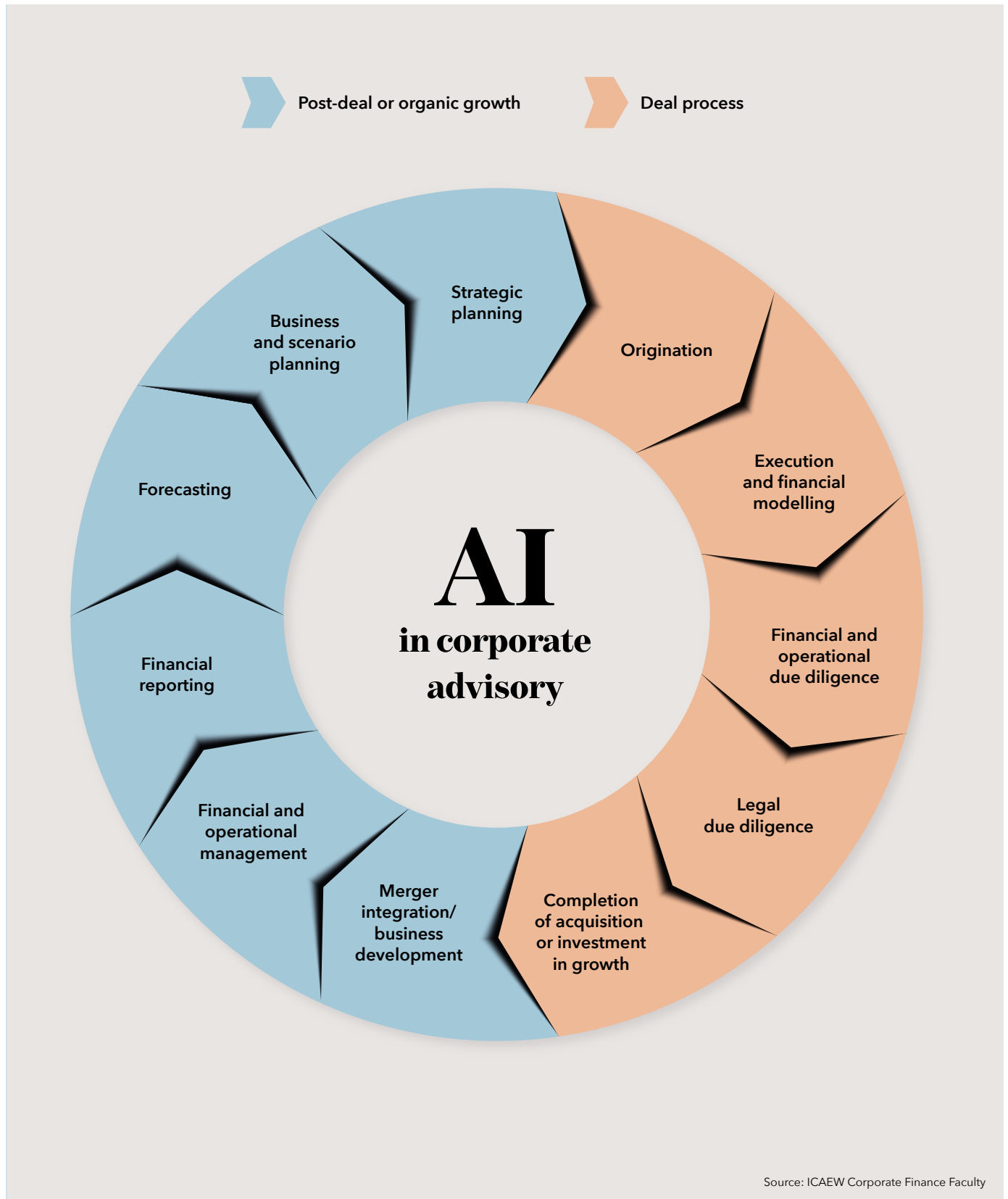
An even more sophisticated approach would be to understand actual deal outcomes in even more detail and to link this knowledge to the characteristics of target companies, using large amounts of historical data. 'The availability of data is an issue here,' said Cameron. And this issue includes the central questions of how much data you would need, across how many variables and on how many transactions to make an effective training set. 'That said, you don't have to solve all the issues above to make meaningful advances.'

64 'Robots scour earnings calls for 'vague' signals to sell', *Financial Times*, 11 April 2019.

65 'Rise of the machines in VC investing', *sifted* (web), 12 February 2019.

66 axial.net/whatisaxial

THE APPLICATION OF AI IN CORPORATE ADVISORY



Capital raising

Rumours abound that some large private equity firms are beginning to experiment with AI. That is unsurprising given their combined investment power. For this report, we could find none that would admit that they are doing any more than thinking about it yet. Most continue to rely on corporate finance advisers and transaction services professionals for their deal flow, analysis and due diligence.

PwC's Euan Cameron commented to us: 'Few private equity firms are deploying AI, because most don't have the scale to do so. You are starting to see some beef-up by hiring data scientists. They may have one or two experts looking at portfolio companies for value creation opportunities. On the whole, though, they're looking to advisers like us to help.'

Company valuation

Valuation may be a natural area to use advanced tech to identify comparable businesses and assets, develop appropriate metrics and automated analytical tools, with outputs then checked by skilled professionals.

KPMG is trialling new tools to find out the extent to which judgement can be reduced to better data when it comes to valuations. But, as illustrated by the Corporate Finance Faculty's recently published best-practice guideline (co-authored by KPMG),⁶⁷ valuing a business is vastly more complex than valuing a car on a price-comparison website. High-quality data about genuinely comparable companies is not as easily available as data about vehicle engine specifications.

Negotiations

Could AI be used even in that most 'human' part of the deal - negotiations? Edward Chan, a banking partner at Linklaters, told us why he thought so: 'This is interesting because so much of negotiations centres on things like warranties, etc. That may just be because we don't have the right data to hand. Some clients often wonder why some contracts take longer to negotiate than others. If we had the right data, we could identify the clauses that commonly cause issues. If we could identify the bottlenecks, that could save some of the time taken to work around these.' It would also be possible to work out quickly which clauses were superfluous and which were significant for a deal.

Joseph Altendorff, a corporate partner at Dentons, foresaw technologies currently used to predict litigation outcomes also being applied to M&A negotiations. 'It could determine how a particular point might be negotiated and how the other side might react to certain terms, based on historical data. It could be used to find out what the market standard is on certain terms.'

Euan Cameron, UK Artificial Intelligence Lead, PwC, told us: 'Here you'll see a more warts-and-all environment.' Once buyers and investors have potential access to comprehensive sources of data and more sophisticated analytics, they might expect target companies to disclose more information. But it will be vital to maintain appropriate commercial confidentiality and, where applicable, consumer privacy.

⁶⁷ ICAEW and KPMG, *Contemporary Valuation Issues in Deals*, Corporate Finance Faculty Best-Practice Guideline 66, November 2018.

Deal completion

Deal completion involves highly technical processes which are themselves subject to negotiation and which cannot simply be automated.⁶⁸ But PwC's Euan Cameron suggests that information contained in the ubiquitous sale-and-purchase agreements (SPAs) could be subject to AI: 'You could aggregate and understand the learnings and insights from hundreds or thousands of previous contracts.' Machines have the potential to be less fallible than humans in this area.

Post-transaction to exit/divestment

After an M&A deal has been completed, there could be considerable scope for AI in private equity, for example, as Derek Neil, Transaction Services Partner at BDO, suggested to us: 'PE loves data. I can see opportunities for PE to start applying AI to squeeze more value out of companies, identify operational improvements, visualise data to see, for example, where there are unbilled revenues, or to assess the effect of a price increase on EBITDA.'

Euan Cameron explained: 'We're starting to see the creation of more comprehensive data sets, and that allows us to identify more interesting and exciting value creation opportunities that a business may not have identified before.' The analytical tools that underpin AI have extensive reach across industries and value chains, he said. This enables private equity investors, for example, to start looking even deeper within the operational processes of a business and to better understand business models and new ways of creating value.

AI AND DUE DILIGENCE

Transaction services are central to all major corporate deals. Such services include financial and other forms of due diligence, which are formally defined as 'an investigation into the affairs of an entity (which may be a division, a stand-alone company, a group of companies or some other form of business entity) before its acquisition, disposal, flotation, refinancing, restructuring or other similar transaction'.⁶⁹

Their purpose is to enhance an acquirer's or an investor's understanding of a target business, corroborate information about reported and underlying performance, test key assumptions and inform valuations, financial projections, structuring, negotiations and risk management.

The considerable potential for the application of machine learning to legal due diligence is now widely recognised - and already the subject of many R&D projects. The legal due diligence process can require searches through tens of thousands or hundreds of thousands of documents of many different kinds in order to identify risks and actual and potential liabilities for acquirers or investors in a company. This new information then becomes the basis for further disclosure by the selling company and negotiation with an acquirer or investors. AI-based applications could be used to automate many parts of that process - including the location of documents, their identification, standardisation, indexation and ranking for relevance.

When it comes to financial due diligence, the transaction services professionals in accountancy firms who carry out this work have often been relatively early adopters of new technology - from using Microsoft Excel since the early nineties through to adopting Tableau software for data visualisation in recent years.

⁶⁸ See for example, ICAEW and Grant Thornton, *Completion Mechanisms: determining the final equity value in transactions*, Corporate Finance Faculty Best-Practice Guideline 64, October 2016.

⁶⁹ ICAEW and PwC, *Financial Due Diligence*, Corporate Finance Faculty Best-Practice Guideline 51, September 2009.

Jonathan Stubbings, a transaction advisory services director at Grant Thornton, explained to us how this is based on client demand: 'In what we call the "dynamic mid-market" of companies and private equity firms doing deals with an equity value of between about £5m and £100m, clients still want to buy the right business, at the right price, and accurately assess the risks involved. But they've become much more sophisticated in the range of services they want.' Those services include traditional acquisition due diligence, vendor due diligence (VDD) and vendor assist. The latter is when advisers work with clients to provide a business's financial and operational data in a usable format to potential acquirers or investors but without a formal VDD process.

According to Stubbings, Grant Thornton in the UK is just beginning to benefit from the capabilities of data analytical tools such as Tableau. 'This really has a big role to play in what we're doing.'

The potential for AI-based technologies in the due diligence process is huge - but it will also require great professional care, according to Jan Chan, UK&I TAS Chief Innovation Officer at EY: 'There is a lot of risk around this, so we have a high level of human involvement here. Yes, we can have rapid access to information, but we're not at a point where we can just sell the services on a computer. The risk is just too high. However, for us, AI is a tool to improve insight and we add human rigour. We can collect and validate information and get human input on risk assessment.'

Euan Cameron commented: 'The questions here are, how can you use AI to make due diligence faster, more accurate and more insightful, and how can it change the questions you ask? The process of due diligence will change a lot. There will be greater demand for - and therefore provision of - access to information in much greater granularity.' This information will come not only from traditional forms of management information, including P&L, cash flow and balance sheet, but also from other textual, sensorial, geospatial and image-based data. 'You will start to see the old-fashioned boundaries of financial, commercial, etc, start to blur, and you will then get a holistic facsimile of a business. It won't be lots of information and DD reports contained in silos.'

Transaction services professionals are also often asked not only to assess financial information and performance, but also to consider other commercial, operational, fiscal, technology and personnel information and issues of environment and social governance. The breakdown of these silos could increase the ability of advisers - using more advanced systems - to provide a more holistic view of companies and transactions, combining many different sources of information and risk assessment.

Clients are demanding ever more speed and depth.⁷⁰ Derek Neil, a transaction services partner at BDO, said: 'What you could see in the future is a convergence of due diligence work. At the moment, you have different teams often working in different companies putting together commercial, financial, market, IT, etc, due diligence. You could have some really powerful information and insight if you integrated all the data and everyone worked from the same information on the same platform. You could combine demographic information with commercial information, for example, to find new growth avenues or identify risk at a more granular level. You can use the processing power of AI to cross-reference different sources of information.'

When it comes to legal due diligence, Edward Chan, a partner at Linklaters, said the firm uses workflow technology suppliers such as Kira Systems and iManage RAVN to identify and extract information, which is then analysed and checked by lawyers. This can 'super-charge' lawyer reviews of thousands of documents, saving up to 40% of the time taken when using more manual processes.

⁷⁰ See: Marc Mullen, 'Finely Tuned', *Corporate Financier*, May 2018.

THE CHANGING ROLE OF VIRTUAL DATA ROOMS

One of the most significant applications of AI-based technologies is to virtual data rooms (VDRs). These are at the heart of many major corporate transactions, including private equity-backed deals. Given that the purpose of VDRs is the management of and controlled online access to the documents required during due diligence, they are a big area of opportunity for those involved in transactions, and they can help in managing risks. But they are, of course, not themselves risk-free (any more than other areas of business and finance) – and so they need careful, expert management.

The role of VDRs is already expanding. Two decades ago they were simply an online version of the physical spaces where access to confidential or sensitive information was provided to the professionals carrying out due diligence. Now, they are very secure online platforms for many aspects of the deal process and automated workflow. Drooms has even developed application programme interfaces (APIs) that connect with investment banks' and advisory firms' proprietary IT systems.

VDR platforms are utilising AI and machine learning to help run deals of all sizes even more efficiently. To ensure a high standard of security and reliability, Drooms has developed and integrated its services in-house, instead of relying on third-party products. Drooms has ongoing partnerships, including with multinational law firms, to ensure that it develops new features that are in line with market needs. In some cases, it supplies the platform directly to corporate clients, and to banks, such as UBS, that use 'permanent data rooms' to manage portfolios.

For the past 18 months, Drooms has deployed AI-based technology that is being used to analyse and filter content so that expert professionals can sift through and appraise vast quantities of data much more quickly. A process – known as 'Auto-allocation'⁷¹ – can also save people many laborious hours. The company has also added translation facilities (not dissimilar in capability to Google Translate), which are particularly useful for cross-border deals and for due diligence on companies that do business in more than one language. It is currently developing this capability in Arabic, having had success with 'difficult' languages such as German and Turkish.

For private equity firms in particular, a 'deal lifecycle tool' developed by Drooms helps to create a controlled, standardised environment for documents relating to deals and portfolio companies, which can aid portfolio tracking and reporting and can also speed up an exit process.

Petter Made, Director of Online Business & Head of Product at Drooms, said that although AI can achieve impressive results in specific use cases, it will not displace professional expertise: 'We shouldn't expect "AI lawyers" in the next ten years. We're several orders of magnitude away from that. The work done by humans in M&A is far more complex than the technology can handle.'

'In M&A, there's an incredibly broad set and a huge volume of material that needs to be reviewed. There are also many tasks and roles. We can build tools that improve the quality and efficiency of results from the information, so we can provide technology-assisted review and workflow. Where there is repetitive and mundane work that needs to be done with a high degree of accuracy, we can identify use cases for AI that enable people to exercise judgement and draw on their experience.'

Made said that the NLP used by Drooms can eliminate the irrelevant information, leaving the relevant information ready for human review. But the effective digitisation and collection of material in M&A systems is important for the current and future development of systems. For example, the auto-allocation function requires good character recognition, which makes the quality of scanned material vital. 'Without this, you can't develop more advanced features further down the line.'

⁷¹ The auto-allocation feature sorts all incoming documents to the right index points, helping to speed up workflows. The functionality is 'smart'; it reads, categorises and allocates documents, based on their content.

The VDR's search functions also use machine learning. They produce lists of relevant findings (for example about 'change of control') based on templates that have been either developed by Drooms, or customised by the client. The reviewer can then add notes to the whole system. This is a kind of assisted learning because the system is being trained in the background as users search and add information and analysis to it. Over time, the search results become even more relevant.

Made warned that developers such as Drooms have to create tools that fit into familiar workflows so that people almost intuitively know how to use them. 'There's no point building high-tech tools that operate in ways that are unfamiliar,' he said.

But areas such as predictive analytics are some way off. 'These are the holy grail,' said Made. 'M&A overall is very broad and AI is chipping away in specific areas, but it can only really be applied to very specific use cases currently. It's a bit like a baby - it has a lot of intelligence potential, but it has to grow, take in information and learn to do tasks. Machine learning is the same, but this is the case for specific tasks. Where you have information in a basic, unified format, these tools can give you relevant results and they are already saving a lot of time. As machine learning develops, we'll see more complex use cases.'

Drooms can also provide clients with heat maps that show the level of interest among bidders, based on their engagement with specific information in the various parts of the VDR.

Petter Made suggested that predictive analytics - combined with data visualisation techniques - could be the technology with the biggest impact on corporate advisory over the next ten years. 'Overall, the interface will be more visual - systems will extract knowledge from documents and connect information, following different streams of examination, to help users to uncover facts and find what they are looking for.' This could also make a big difference in negotiations (see page 39). 'There is currently so much focus on warranties, but people may not need to be as aggressive on this in the future.'

RECOMMENDATION



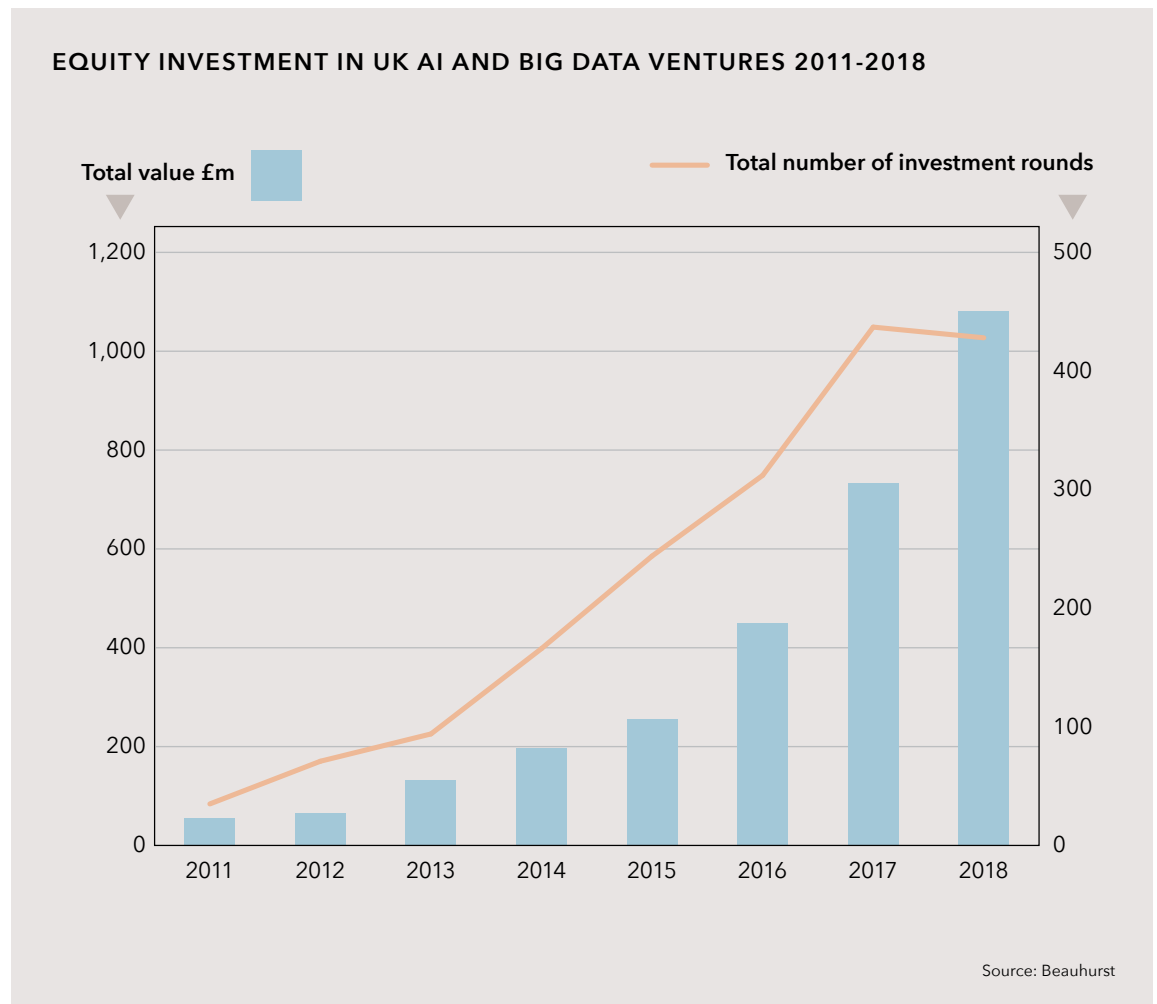
Major professional services firms and professional organisations, such as ICAEW, should publicise the potential benefits of AI-based technologies for corporate transactions, when combined with professional expertise. These benefits include faster, more accurate and more insightful due diligence processes.

Chapter 5

Investment in corporate advisory and professional services

‘The hype-meter is currently off the charts. We’re still in very early days. The operative word in AI and machine learning is ‘learning’. You can’t just create AI and use it off the shelf, you have to create customised solutions to particular pain points or problems and then teach the system what it needs to do. Human-plus-machine is far better than either/or.’

Dan Jansen, Chief Executive and Managing Director, Nextlaw Ventures



Public-sector and private-sector investment in AI applications for corporate advisory is still at a very basic level - particularly in the UK, for example - but it is set to increase markedly over the next few years. As argued in Chapter 1, the UK is in danger of falling behind the emerging AI 'superpowers' - the US and China - if it does not follow up the relatively modest government investment made in AI via its Industrial Strategy.⁷² The expansion of pioneer programmes such as Next Generation Services as part of that strategy (see page 48) is important for catalysing innovation and private-sector investment.

In this chapter, we take a brief look at where private-sector investment is beginning to take place, particularly in the UK, in terms of early-stage deals, corporate venturing and public-private collaboration; there has so far been little M&A that's directly relevant to this report.

Venture investment in AI is still nascent, but some significant deals are starting to be done across Europe, including the UK. In May 2019, Cambridge-based Prowler.io raised \$24m, valuing the business at \$100m. The company has developed an advanced decision-making platform called VUKU, which does not require the same large amounts of data as mainstream machine learning and which could be used in financial services, education, logistics and smart cities, for example. Amadeus Capital Partners,

⁷² See: icaew.com/industrialstrategy

Atlantic Bridge, Cambridge Innovation Capital, Mandatum Life, Passion Capital, Pearson, RB Capital, Singapore Innovate and Tencent have all invested in the Prowler.io.⁷³

IN-HOUSE INVESTMENT AND COLLABORATIONS

Much of the investment by professional services firms in AI is to support the organic growth of new projects, plus expansion by means of recruitment and by making small acquisitions of specialist firms. This is all about capacity, about extending international networks and alliances, providing additional services and developing new technological capabilities.

For example, since the Great Recession of the late 2000s, the Big Four have each made acquisitions around the world in specialist consulting, digital technology houses, risk management, cyber security and analytics – although few specifically in AI.⁷⁴

Jan Chan, UK&I TAS Chief Innovation Officer, explained EY's current approach to us: 'We build all our technology in-house using open-source machine learning approaches. We'd prefer not to outsource IP and we keep it in-house wherever possible. AI offers opaque solutions; if you haven't built the system, you don't know how it's constructed and you don't necessarily understand how it has arrived at a particular answer.'

Some major law firms, including Allen & Overy and Slaughter & May, have set up their own technology incubators – a 'non-traditional' step in what has historically been a conservative profession.

Edward Chan, a banking partner at Linklaters, spoke to us about his firm's backing for Nakhoda. 'This is an internal start-up so that it has a degree of operational autonomy,' he explained. Nakhoda is working with the International Swaps & Derivatives Association to develop a document-creation and negotiation platform for derivatives trading. It was launched in January 2019.

'We have around 100 institutions in the sandbox and we're migrating them onto the live system,' said Chan. 'Derivatives documents are largely standardised and the idea is to capture structured data at the point of creation – so it's as we go along.'

Collaborations between professional services firms are another route to growth, one example being Engine B (see page 31). Meanwhile, a consortium of 18 large law firms, led by Latham & Watkins and Clifford Chance, is supporting Reynen Court, which has created a shared-services automation platform for AI and smart contracts.⁷⁵

EARLY-STAGE VENTURES

There are already many start-ups around the world offering platforms and software based on AI technologies to companies, and in particular SMEs, to provide, for example, relatively simple accounting and financial reporting functions, as well as legal processing.

In the UK, many of these start-ups have not yet moved beyond seed-stage funding amounting to hundreds of thousands of pounds. But that could change rapidly given the large amount of venture capital chasing the next big thing in AI. Research firm Beauhurst has found that more than £1bn was invested in equity finance rounds in AI and big data ventures in 2018, across more than 400 companies. More than £3.3bn in total has been invested since 2011 – but with a particularly big pickup since 2015.

73 'Tencent, Pearson Among Backers of \$100 Million UK AI Startup', *Bloomberg* (online), 20 May 2019.

74 See, for example: 'Switched on Deloitte', *Corporate Financier*, November 2016.

75 reynencourt.com

Venturing out

International law firm Dentons has taken a different approach, establishing a venture fund, Nextlaw Ventures, four years ago, together with venture capital firms and technology developers.

Nextlaw Ventures is led by Dan Jansen, who described 'legaltech' to us as somewhat like fintech's little brother: 'It is smaller and younger.' Five years ago, there were 50 legaltech companies, and now there are 1,500, according to Jansen. Nextlaw already has a portfolio of ten companies, including Libryo, a London-based developer of software that manages regulatory complexity, which is being trialled at Dentons.

Joseph Altendorff, a corporate partner at Dentons, explained: 'When legaltech was nascent, as a firm we were already asking ourselves questions about how to solve issues on the horizon. We kick-started the fund so that we could informally partner with other organisations and get a view on what was coming down the line.'

'We recognised that it needed to be run by a professional investor and that it shouldn't have an exclusive relationship with Dentons. It's a classic VC investment. We co-invested alongside SeedCamp. This is not about swallowing companies. It's an opportunity to seed investments and enable portfolio companies to beta test software with Dentons.'

Jansen said: 'Dentons's involvement is a win-win-win. It offers us as investors a whole law-firm ecosystem, from the firm itself through to its tens of thousands of clients. Using this, we can more easily identify the pain points and needs in law firms and their clients, complete more thorough due diligence on investments, and pilot our portfolio-company solutions with Dentons and their clients. This helps our portfolio companies to accelerate and compresses their route to sales. At the same time, Dentons can shape the solutions to fit the firm's needs.'

Nextlaw is now raising a new fund, its second, again with financial backing from Dentons and other external investors.

In finance, one example of such a fast-growing start-up is Rimilia. The business, which has offices in Bromsgrove, London and Denver, is developing robotic process automation (RPA) software and predictive analysis tools to automate aspects of companies' cash management. Kennet Partners and Eight Road Ventures committed \$25m to the business in 2017.

The Law Society has forecast that there has been so much early-stage investment that a period of start-up activity 'is now ripe for a wave of consolidation and later-stage funding'.⁷⁶

Luminance, a prominent developer of AI-based software for document management in corporate analysis and due diligence, has received more than £20m venture capital, in several rounds. Its backers include Invoke Capital, Talis Capital and Slaughter & May.⁷⁷ In February 2019, it was reported that EY would be using Luminance across its own global legal network.⁷⁸

⁷⁶ The Law Society, *Lawtech Adoption Research*, February 2019.

⁷⁷ Source Beauhurst: beauhurst.com

⁷⁸ 'AI Platform Luminance Teams with EY Law in Global Deal', *Legal Week* (web), 18 February 2019.

Also noteworthy in this respect was when US group iManage bought London-based RAVN Systems in May 2017. Founded in 2010, RAVN had developed an AI platform that can organise, discover and summarise relevant information from large volumes of legal documents and unstructured data.

PUBLIC-PRIVATE INVESTMENT AND THE UK'S INDUSTRIAL STRATEGY

In November 2017, the UK government published its Industrial Strategy, with the aim of increasing economic productivity by stepping up investment in R&D, work skills, new industries and infrastructure. The strategy included 'AI and the data economy' as one of its four 'grand challenges', alongside clean growth, the future of mobility and the ageing society.⁷⁹

It then published an AI Sector Deal in April 2018. The government valued the measures in the 'deal' as worth £0.95bn - including £603m of new government money. This included, for example, £93m for new R&D in robotics and AI, a £20m 'GovTech' fund for the use of AI in public services, £300m of Engineering & Physical Sciences Research Council (EPSRC) investment in data science and AI research and £42m EPSRC money for the Alan Turing Institute. The government also planned to create an additional 200 doctoral studentships in AI and related disciplines a year by 2020-2021.

The UK government's Industrial Strategy Challenge Fund included a £20m 'pioneer' sub-fund for Next Generation Services (NGS). The intention was to stimulate R&D and commercialisation projects in the application of AI to legal services, accountancy and insurance.⁸⁰

UK Research & Innovation, the government agency that via its Innovate UK arm manages the Industrial Strategy Challenge Fund (including NGS), has backed three research projects and 41 collaborative consortia to test potential commercial concepts. Of these, about half a dozen directly apply to accountancy and company financial systems and reporting, with none related to M&A. The much broader innovation potential of NGS means that there could be even greater benefit to the UK's economy if the pioneer fund were followed up with a larger, longer-term investment programme.⁸¹

RECOMMENDATION



Initiatives such as the UK's £20m Next Generation Services pioneer programme, part of the government's Industrial Strategy Challenge Fund, should be expanded, to help them work as catalysts for further innovation and private-sector investment.

⁷⁹ To see a clear visual explanation of the Industrial Strategy, which was created for ICAEW's conference Boosting Finance for the UK's Industrial Strategy on 4 July 2018, go to icaew.com/boostingfinance

⁸⁰ See Stephen Browning, 'Tapping AI', *Corporate Financier*, April 2018.

⁸¹ ICAEW has supported Innovate UK and the NGS pioneer programme in many ways, including extensive communications with ICAEW's 180,000 ICAEW Chartered Accountants and students, participating in the bid assessment processes, and membership of the NGS programme's advisory board.

Chapter 6

Corporate advisory in the 2020s

‘If you can clean up data but you can’t understand and articulate the value the data has, that’s not very useful. Professionals need to learn to talk to the people who can work with the data, and vice versa. You need to be able to team the two together.’

Dr Mark Kennedy, Associate Professor, Imperial College Business School

POTENTIAL AREAS FOR FURTHER RESEARCH

The use of advanced digital technologies, including AI, by chartered accountants is already embedded within the syllabus of ICAEW's core qualification, the ACA. How could AI in a corporate advisory context also be introduced to the ACA, and integrated with the Institute's Diploma in Corporate Finance?

How are corporate transaction processes changing - and being changed by AI - at each stage? How much time is spent at each stage? What are the potential consequences for the expertise, judgement and trust required by the professionals involved?

What are the new potential career paths and opportunities in the adoption of AI-based technologies in corporate finance?



How might the Corporate Finance Faculty's Principles of Professional Conduct be developed to take into consideration much broader ethical and professional discussions about the role of AI and big data?

Should professional bodies such as ICAEW play a role in testing and possibly certifying AI-based technologies and tools?

Source: ICAEW Corporate Finance Faculty/Drooms, *AI in Corporate Advisory*.

EMERGING TRENDS

The view ahead for the future of corporate advisory is not an unclouded one. Clients are demanding ever more speed, depth *and* sophistication in the services provided to them. At the same time, there are likely to be more risks – and more regulatory pressure across the world – not just in M&A, but also for major corporations in general, and digital giants in particular; and the accountancy profession is under increased political scrutiny, particularly in the UK.

When it comes to the application of AI, we come back to some big questions that warrant much more discussion and further research:

- Where is the value for companies?
- Where is the value for their investors?
- Where is the value for professional advisers?
- Where is the value for society – and for the economy, which underpins society?

Euan Cameron, UK Artificial Intelligence Lead, PwC, explained: ‘Lead advisory is one of the most people- and relationship-based service offerings. You need to know the agendas and motivations of the people you are dealing with in order to forge partnerships with them. It’s not just transactional work.’ This does not suggest the imminent replacement of humans with robots, but instead the augmenting of human insights and the automating of repetitive work: ‘There is a whole lot of work going on behind the scenes and, currently, a pyramid of staff needed to do this. So that’s the part where AI can really make a difference.’

RISK MANAGEMENT AND ETHICAL CONSIDERATIONS IN CORPORATE ADVISORY

In *On the Future: Prospects for Humanity*, Martin Rees, the Astronomer Royal, calls for ‘responsible innovation’ in AI by scientists.⁸² That principle could also be applied to businesses, financiers and corporate advisers.

As ever, human ingenuity, adaptation and cooperation are at the heart of what happens next. There are no inevitable, predetermined forces at work when it comes to economics, nor should we let the tired trope of unavoidable ‘unintended consequences’ limit us when it comes to thinking ahead about new ethical and regulatory questions and new social – and business – models.

Aspects of AI such as accountability, ‘explainability’, transparency and bias will be particularly important in democratic societies, such as the UK, that value individual freedom as well as social responsibility. In many cases, business regulations, protocols and best-practice frameworks already exist that take into account democracy, social justice, employee rights, diversity and corporate governance.

It is also up to professionals and professional bodies, such as ICAEW, to encourage collaboration in best practice and to set high standards in the face of rapid technological change. One successful example that is pertinent for AI in corporate advisory is the work involving HM Government, the Corporate Finance Faculty and twelve other organisations that created *Cyber-Security in Corporate Finance* in 2014.⁸³

⁸² Martin Rees, *On the Future: Prospects for Humanity*, Princeton University Press, 2018.

⁸³ HM Government and ICAEW, *Cyber-Security in Corporate Finance*, January 2014.

THE NEXT GENERATION OF PROFESSIONAL SERVICES

In the short term, it's still difficult to see how computer algorithms could supersede the client relationship management, origination, negotiation, evaluation and professional networks involved in lead advisory.

Some experts argue that there will be radical change, and very quickly. Shamus Rae, Head of Innovation, Digital Labour & Cognitive Transformation at KPMG, argues: 'Lots of people have their heads in the sand. The reality of AI is that you can automate transactions. The question is whether you can automate judgement. I'd argue that you can, because judgement is based on data. You just have to have enough of it that is high quality. Professional firms sell into clients a pyramid of staff. Automation will take out the bottom two tiers and that's where a lot of the profit comes from.'

'AI-co-working' and 'augmented intelligence' may be the order of the day, instead of the simple replacement of jobs by AI, as Michael Wignall, UK CTO at Microsoft, suggested to the authors of this report: 'One of the things to bear in mind about AI is that it is inherently probabilistic, unlike other forms of tech, which tend to deal in absolutes, ie, "this is the answer". There's always an element of doubt. Even if you had perfect data, you would never get a perfect answer, but you can get good results. So you need people in the loop. There are judgement calls needed. You have to take your own risk-based decision.'

From a corporate finance practitioner's point of view, BDO partner Derek Neil said: 'AI will augment what we do in corporate finance. The data analysis we can do will be overlaid with people's experience of M&A and sector knowledge and relationships with management teams. AI won't be leading - it is simply another tool in our armoury. AI at the moment is not good enough to replace people. It doesn't have a feel for sectors or human experience. It can be used for phase 1 in due diligence, for example, to flag anomalies and shows us as humans where to focus our efforts.'

In the short to medium term, that may mean that we are unlikely to see radical new business models for those who advise on corporate transactions. But we can still expect to see exciting and innovative new collaborations and combinations of professional advisers, consultants, technologists and corporate and investment clients. PwC, for example, brings in specialist data analytics teams to support its due diligence assignments, including financial DD, commercial DD, and cost reduction. This has even helped the firm to win transaction mandates, according to James Fillingham, UK Head of Transaction Services at the firm.⁸⁴

The consensus among those we have interviewed is that a pragmatic, client-led approach is best - but that it will require a rethink about some traditional advisory practices. Matthew Howard, AI Director at Deloitte, explained: 'The main driver of adoption will be customer expectations. The legal profession is currently having to deal with the billable-hour concept, but that is being swept away as clients expect law firms to have the tech to look through vast swathes of documents. You'll see technologies and customer expectations shift and that will have an impact on price expectations. Clients will expect more value from the same price point.'

Oliver Bethell, Chief Technology Officer at law firm Travers Smith, described the challenge as follows: 'Will big tech move into the corporate finance space? Unlikely. But there are opportunities for technology-driven companies to move here if corporate finance advisers themselves don't get organised sufficiently. The professions have long considered relationships as key. The people in senior roles place a strong emphasis on this but, actually, relationships tend to be much shorter these days. Clients undergo regular procurement reviews, especially since the [2007-2008 global] financial crisis. If a new entrant was to come in with a different model that was cheaper and faster, it's not hard to see how that might work out.'

⁸⁴ Quoted by Marc Mullen, 'Finely Tuned', *Corporate Financier*, May 2018.

KPMG's Shamus Rae said: 'The value for corporate advisory and professional services in general has to be relationship-based and founded on trust - that trust underlines everything that we do. If you want to do an acquisition, you want to have someone you trust next to you.'

AI IMPLICATIONS FOR PROFESSIONAL QUALIFICATIONS, TRAINING AND CPD

How should professionals - and their professional bodies - adapt to these new times? Petter Made, Director of Online Business & Head of Product at Drooms, predicted that the next five to ten years will see an increased application of machine learning in tools that integrate seamlessly into corporate and legal workflows, making them even more efficient. Switching back and forth between digital and analogue, as many industries still do, is a practice that will disappear as digital working - including natural language processing and machine learning - cuts costs. 'We need to leave behind wasteful and inefficient work habits in order to adapt to the changing landscape,' he said.

The market in professional services could see even more competition. Derek Neil at BDO warned: 'If we're not careful, you'll have Google and Amazon collecting this kind of data and doing this kind of data analytics. As a profession, we have human experience that knows what to analyse and how to interpret the outputs. What we also have - and this is important to emphasise - is the trust of our clients. As a profession, we need to build the case that we are trusted keepers of clients' information [...] ICAEW has a real opportunity to help the profession differentiate itself from the Googles and Amazons - through training on ethics and data.'

ICAEW's Learning & Professional Development division has developed the Institute's ACA and other qualifications to include the digital skills its members need so that they can benefit from new opportunities presented by technological changes. In corporate finance, modules on AI and on the ethics of AI could be added to current training in analytical and strategic skills - for example, as part of ICAEW's Diploma in Corporate Finance.

Academia is already upping its game for the Age of AI. For example, about 40% of students at MIT, the world-famous US research university, now major in computer science alone or paired with another subject - whether that is molecular biology, economics or urban planning.⁸⁵

Lord Clement-Jones CBE, Co-Chair of the All-Party Parliamentary Group on Artificial Intelligence and a member of the Corporate Finance Faculty's board, explained: 'Professional development is highly important - the need for creativity is paramount. It's not just about training people to use tools; it's about being able to spot how the technologies can be used for a new purpose, making a business case and starting the training process on algorithms.'

The profound changes to finance and business brought about by AI that we referred to in the introduction to this report mean that policy-makers, professional bodies, regulators and industry will need to work even more closely with each other to ensure public confidence and trust. As Professor Birgitte Andersen, Chief Executive of the Big Innovation Centre, pointed out: 'Change will be rapid and organisations will be a little lost. We need bodies such as ICAEW to bring people together, have conversations and coalesce around a clear process for the sector.'

⁸⁵ The President of MIT, L. Rafael Reif: 'Prepare students for a future of artificial intelligence', *Financial Times*, 10 February 2019.

But, as we have detailed throughout this report, AI will also present many exciting opportunities for companies, investors and advisers to collaborate with each other and to combine expertise with big data in novel ways; and that will enable much new and more effective corporate activity, including the development of new markets, new technologies, new services and new ventures.

High standards of professional ethics, governance, qualifications and training will help to shape the development of these exciting AI-based technologies in a way that ensures they benefit the wider economy and society.

RECOMMENDATIONS



Professional bodies such as ICAEW should continue to collaborate with other organisations, governments and regulators to encourage the development of best practice and the highest possible standards – and therefore trust – in the application of AI to corporate transactions.

Enhancing qualifications, training and CPD – including ICAEW’s ACA and its Diploma in Corporate Finance – to help professionals combine their corporate finance expertise with technological competence is a competitive necessity for professional organisations and academic institutions.

Areas for potential future research about AI in corporate advisory include: how corporate transaction processes are changing; how principles and codes of conduct should be adapted; how bodies such as ICAEW could play a role in testing and verifying AI-based technologies; how core qualifications could incorporate AI; and what potential new career paths and opportunities AI could create for people from all backgrounds.

Related reports and information

UK POLICY DEVELOPMENT FOR BUSINESS, FINANCE AND PROFESSIONAL SERVICES

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Secretary of State for Business, Energy & Industrial Strategy, *Government Response to the House of Lords Select Committee's Report on AI in the UK: Ready, Willing and Able?*, June 2018.

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UK Finance/KPMG, *Ethical use of customer data in a digital economy*, March 2019.

GENERAL PROFESSIONAL SERVICES AND LEGAL PUBLICATIONS

EY, *Assurance in the age of AI*, April 2018.

The Law Society, *AI: Artificial Intelligence and the Legal Profession*, May 2018.

Linklaters, *Ethical, safe, lawful: a toolkit for artificial intelligence projects*, November 2018.

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Shamus Rae and Jorge Costano, 'Introduction to AI and Its Impact on the Finance Function', ICAEW/KPMG webcast, 15 May 2018.

ICAEW Ethics and new technologies hub – icaew.com/ethicsandtech

ICAEW Financial Services Faculty, *Principles for the ethical use of big data in financial services*, published online, April 2019.

CORPORATE ADVISORY AND TRANSACTION SERVICES

ICAEW Corporate Finance Faculty *Principles of Professional Conduct*

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Marc Mullen, 'Finely Tuned', *Corporate Financier*, May 2018.

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Jason Sinclair, 'New world order', *Corporate Financier*, May 2019.

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Drooms is a member organisation of ICAEW's Corporate Finance Faculty.



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Vicky is a regular contributor to ICAEW's *Corporate Financier* magazine, among other titles. She has also previously worked for the Corporate Finance Faculty on its major initiative with HM Government, *Cyber-Security in Corporate Finance*, and on the recent best-practice guideline *Debt for Deals*.

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The Corporate Finance Faculty is the ICAEW's centre of professional excellence in corporate finance. It contributes to policy development and many consultations by international organisations, governments, regulators and other professional bodies. It provides a wide range of services, events and media to its members, including its highly regarded magazine *Corporate Financier* and its popular series of best-practice guidelines.

The faculty's network includes more than 80 member organisations. Members are drawn from major professional services groups, specialist advisory firms, companies, banks and alternative lenders, private equity, venture capital, law firms, brokers, consultants, policy-makers and academic experts. More than 40% of the faculty's membership is from beyond ICAEW.

The faculty also provides technical expertise to the ICAEW's Diploma in Corporate Finance.

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