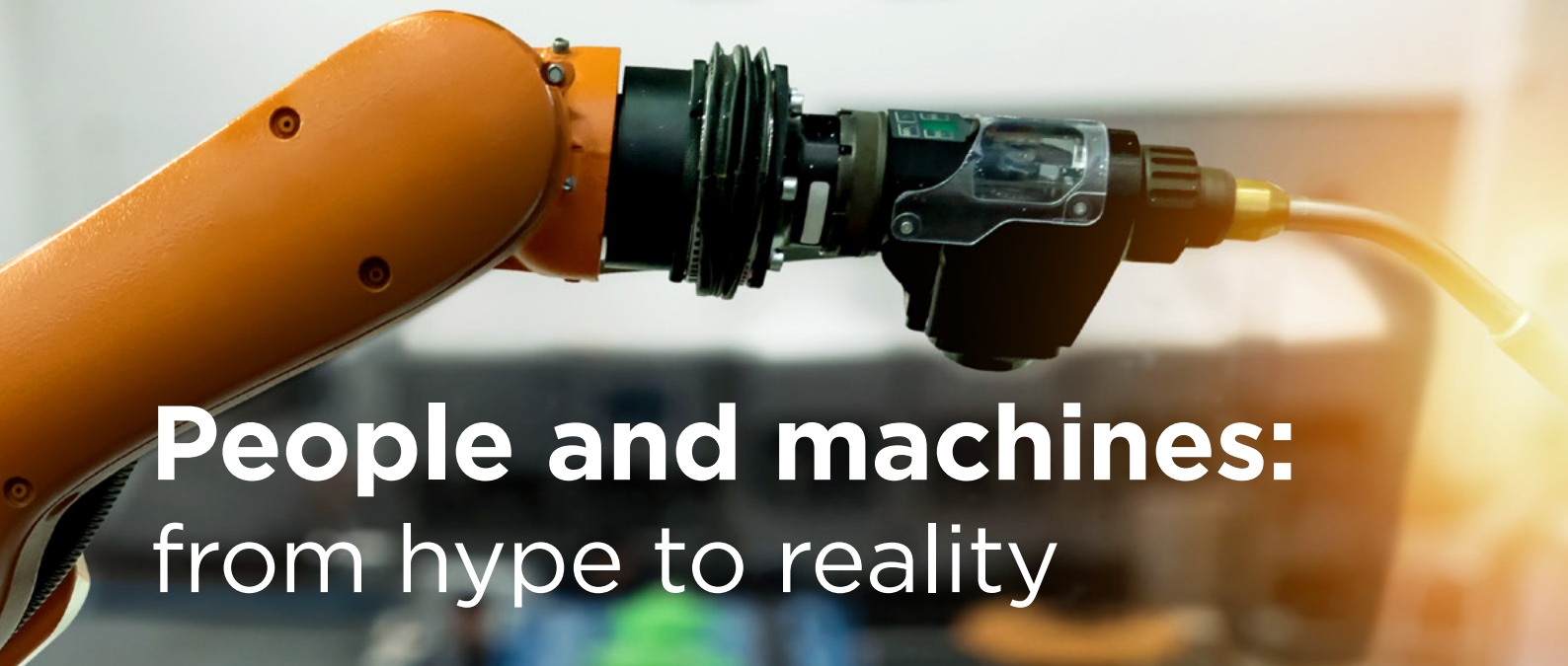


RESEARCH REPORT
April 2019



People and machines: from hype to reality



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Research report

People and machines: from hype to reality

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Acknowledgements

This report was written by Jonny Gifford and Edward Houghton at the CIPD.

We thank a number of people for their involvement in this research.

For the employer survey, we thank Dr Wil Hunt, Dr Sudipa Sarkar and Professor Chris Warhurst at the Institute for Employment Research (IER) at the University of Warwick for their work designing the survey and analysing the data; and we thank Jane Rowe, Ian Neale and colleagues at YouGov for running the survey.

For the case study research, we thank the participating organisations, in particular: Jilly Calder and Gwion Kennard from Atkins, a member of the SNC-Lavalin Group; and Andrea Healey, Joanne Barton, Ruth Ford and Janice Watt from NHS Greater Glasgow and Clyde. We thank Dr Thomas Nessen and Dr Petra Edoff at the Swedish Institute for Computer Sciences at Research Institutes of Sweden (RISE SICS) for analysing the case study data. And we thank the wider research team for their work on the case study research: Melanie Green (at the CIPD), Jaana Nyfjord (RISE), Wendy Suganda (Henley Business School) and Ramya Yarlagadda and Ksenia Zheltoukhova (previously of the CIPD).

Finally, we would like to thank our sponsors, PA Consulting, for their valuable feedback throughout the research, in particular: Jennifer Cable, Katharine Henley, Emily Hill and Heledd Straker.

1 Foreword from the CIPD

Technological developments have been changing work throughout human history. But some innovations have much greater impact than others and the speed with which new technologies have been developed has increased relentlessly. We live in remarkable times, described by some as a Fourth Industrial Revolution driven by artificial intelligence, automation and an ever more advanced internet.

Debates on emerging technology and the future of work centre on the opportunity employers have to automate a rapidly growing range of physical and cognitive tasks. Some argue for an almost utopian view, that AI will free us up to innovate, create more value, work fewer hours – perhaps even the 15-hour week that Keynes so famously predicted – and enjoy a better quality of life.

A more dominant view is that AI and automation lay waste to jobs and livelihoods: robots will take over, leaving poor quality jobs and perhaps mass unemployment. This view is bolstered by research assessing how vulnerable current jobs are to automation. The common phrase ‘at risk from AI’ speaks volumes: it’s assumed to be a danger to personal security and working lives. Yet this ignores the possibility that removing mundane tasks enhances our jobs and, moreover, tells us nothing of the opportunities for completely new jobs that will be opened up by emerging technologies.

In this research, we move away from speculation about the future to consider how AI and automation have actually affected jobs and organisations over recent years. Using a UK-wide survey and in-depth case studies, we shed light on organisations’ current experiences of cutting-edge technology and on the decisions that led them to invest in them in the first place. In the current debates on AI and automation, it is a much needed perspective.

Our research suggests the utopians and doom-mongers are both wrong. AI and automation clearly have the potential either to impoverish and undermine jobs or to enrich them and open up new opportunities for professional growth, although to date the current impact seems to be more positive than negative. However, what we confirm is that AI and automation bring huge change – much more so than other new technologies – and this change needs to be managed.

There is no inevitable impact of AI and automation on jobs. Employers can use them to improve people’s working lives as well as increase organisational productivity, but this cannot be taken for granted. The future of work will be shaped by employers’ decisions on how they invest and embed new technology.

This is a key reason why HR – and an effective people strategy – must be at the heart of decisions on integrating AI and automation with the world of work. Unfortunately, we are a long way from this being the case. We hope this research provides employers and policy-makers with important pointers so that, as organisations and as a society, we can successfully make the transition.

Jenny Gowans

Director of Research, Policy and Content, CIPD

2 Foreword from PA Consulting

AI promises a new role for HR

Artificial intelligence (AI) and automation are sweeping through the world of work. Whether it's checking quality on production lines or walking customers through their options for switching a current account, the revolution is gathering pace by the day. You might even have experienced this yourself, approving colleagues' requests for holiday.

Businesses see the promise of higher productivity and lower costs. Always-on machines will transform how they work and compete. Indeed, at PA we've helped many clients turn this promise into reality and tackle some of their thorniest challenges. This, as well as our experience of working alongside HR teams, also tells us there's more to making a success of technology than just the technology.

That's why we've supported this research. It examines the human side of the AI equation. And it confirms what we firmly believe – that HR has a pivotal and positive role to play in making AI and automation work, for people as well as business.

Businesses need to do more than configure the technology, plug it in and switch it on. They need to prepare their workforce and rethink their culture. As businesses plan for an automated workforce, they'll need the foresight to map the roles needed and ensure these remain meaningful and stimulating.

'The myth about the future of work is that we can only guess what will happen and then wait passively until it arrives. That is not the case: trends such as AI and automation are shaping the world before our very eyes, but it is up to us to decide how we will use these technologies to create the future we want. HR can – and should – become a key voice in the development of AI and automation in the workplace such that it achieves business goals by meeting the needs of people. Indeed, HR is central to creating the future of work.' **Heledd Straker**, Future of Work Expert

Only HR can take the lead here, orchestrating the debate on who does what work, when and where – and ensuring people are appropriately skilled and supported.

Another striking feature of these figures is the level of well-being and job satisfaction that AI and automation are bringing. Many people appreciate the extra control they're getting over their working hours, and say they're learning new things as well as losing routine tasks. It's a long way from the 'robots will take my job' anxiety that dominates the media's image of AI and automation. It shows there's an opportunity for HR to encourage businesses to think big and seize the opportunity to transform themselves.

These findings tell us that HR is the glue between people and machines. They tell us that HR has a new mission: to help businesses map their future with AI and automation and help people find their purpose in this new technology-enabled world. We hope you agree.

Katharine Henley

Workforce Transformation Expert

Jennifer Cable

Talent Management Expert

3 Introduction

A Fourth Industrial Revolution

New technologies and automation in the workplace have long been a part of our everyday life. They can enable improved performance and productivity, reducing errors, improving quality and increasing speed. But a recent trend has emerged in the nature of technology and its impact on work and organisations.

In previous eras, new technologies were primarily machine driven, such as steam power to mechanise production and electric power to facilitate mass production. Now we are seeing a new era, a Fourth Industrial Revolution, described as *'exponential changes to the way we live, work and relate to one another due to the adoption of cyber-physical systems, the Internet of Things and the Internet of Systems'*.¹

Current emerging technology centres on artificial intelligence (AI), including both machine learning and set automated algorithms, and robotics. This latest era is changing the nature of work in new ways, where the technology not only assists in basic physical tasks, but also tasks that require higher cognitive functions. In addition, AI and automation can result in new integrations and co-operation possibilities and challenges, which also can create new types of jobs and services.²

Such potentially profound changes to the work that people carry out raises major questions for employment policy and practice. Organisations need effective people strategies on AI and automation, considering what will enable these technologies to reap performance gains, the skills needed, and the impact on workload and employee well-being. These are the core areas we investigate in this report. First, though, we consider what we mean by AI and automation.

The emerging landscape of work technology

Emerging technologies are key factors to some of the major changes in today's workplace. There are many emerging technologies in today's workplace – a recent CIPD review identified artificial intelligence (AI), robotics and automation as three important forms.³

Artificial intelligence

AI is a wide concept that can be difficult to define. One definition is the development of computers to engage in human-like thought processes, such as learning, reasoning and self-correction.⁴ It readily includes machine learning, as well as more linear cognitive computing. Functions can include statistical analytics, language and speech processing, and visual processing, including facial recognition. 'Strong' AI is currently a more philosophical concept that entails systems with superhuman intelligence that mimic the human brain in its capability and functions. However, since it is difficult to even determine what human intelligence is, the exact concept of strong AI may be difficult to achieve. 'Weak' AI is easier to achieve since it concerns tasks that can be broken down into smaller processes that require specific cognitive processes, such as probabilistic reasoning.

Robotics

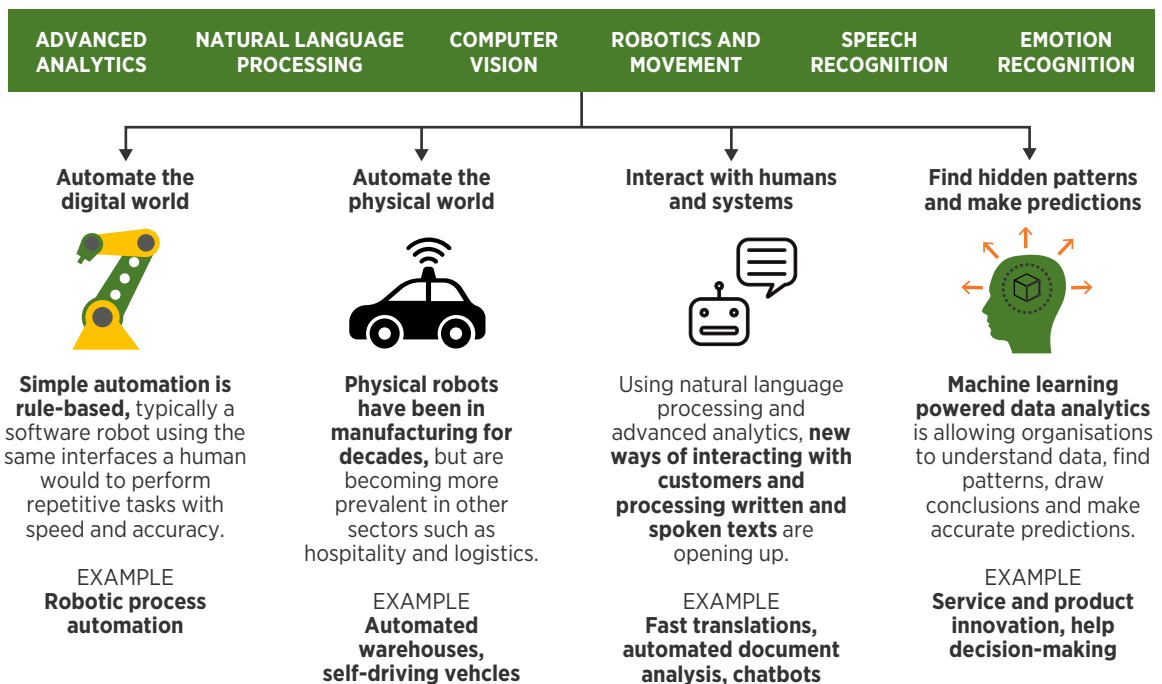
One early use of the word robot was in a 1920s play by Karel Capek about android robots in a factory where the robots were more effective than humans. Now robots are used in a variety of areas and are playing a larger role in many companies around the world. Robots can do things humans do at much higher levels of performance, far more flexibly and cheaply. They can aid in performing tasks without any need of outside guidance, including sorting, packaging, and facilitating human actions – for example, surgical robots, which removes trembling. Robots are also integrated with software (robotic software solutions), suitable where there are many data inputs such as in customer relationship management (CRM) systems.⁵

Automation

Today, automation can be viewed as a large area, defined as the performance of tasks or activities by machines, including robots and computers, rather than humans. The purpose is often to increase efficiency and reduce variability. Automation can not only perform (routine) physical work tasks better and more cheaply than humans, but also includes tasks involving cognitive activity.⁶ The purpose of automation can include information acquisition, information analysis, decision and action selection, and action implementation.⁷

In this report we refer to these emerging technologies collectively as ‘AI and automation’. Figure 1 elaborates on current applications.

Figure 1: Current applications of AI and automation



(Credit: PA Consulting)

A game-changer in the world of work

This latest era of technological change arguably focuses more on freeing humans from performing manual or process-oriented tasks.⁸ Certainly, it seems AI has ‘*an unmatched ability to understand and predict behaviours that could offer huge benefits*’ in many aspects of science, business and public services.⁹ However, with this follows challenges requiring change and adaptations by individuals, organisations, corporations and government.

For good or for bad?

From the CIPD review on the impact of AI and automation, we saw that research on the impact on jobs is divided, ranging from predictions of large-scale job losses to hardly any job loss and even job gains.¹⁰ It is clear that AI and automation can create new possibilities and new jobs, extending human capabilities.¹¹ However, it is equally apparent that it can replace as well as complement human work, prompting a fear that jobs will be eliminated.¹²

What is clear is that AI and automation could lead to major changes in the requirements of employees and the composition of the labour market. For instance, they ‘*will eliminate some tasks and roles that have previously formed an important part of the career progression ladder. Loss of some of the lower rungs of the ladder may lead to difficulties in providing a clear career development path for the leaders of the future.*’¹³

The opportunities to use AI and automation and the challenges presented by their applications will vary across industries and for different types of work, such as physical labour, analysis, routine administration or management. Nonetheless, we can expect a wide-scale shift in workplace skills needed, as new job tasks materialise. AI and automation can not only perform tasks previously undertaken by humans, but also observe information and undertake analysis in new ways, potentially making room for more creative or higher-level job tasks. As such, we may see a surge in demand for certain technological and creative skills, with other physical and basic cognitive skills – such as data inputting and processing – becoming less needed.¹⁴

Augmentation and people-tech interaction

With the potential for AI and automation to become part of many job tasks, the concept of *augmentation* of human work, rather than *replacement*, becomes increasingly relevant.¹⁵ Although AI and automation in many cases outperform humans, people are still essential for many businesses to flourish. For example, relationships and the social aspect of human-computer interaction are important mediators to achieve benefits, such as increased performance accuracy from AI and automation.¹⁶

Indeed, long-term organisational performance can suffer when technology is developed and implemented from a short-term efficiency perspective and human considerations are not adequately taken into account. A new technology can look great on paper but misfire badly on the ground. Workers' autonomy, job complexity, skills utilisation and motivation, as well as more functional considerations, such as human-technology interactions, are all important influences on whether technologies achieve their strategic aims.

Furthermore, the impact that AI and automation have on worker well-being and their impact on organisational performance are ultimately inseparable.¹⁷ Sustainable organisations include attractive workplaces where employees have both their practical needs fulfilled – such as salaries, benefits and work-life balance – but also provide interesting and motivating jobs where they can flourish, find some fulfilment in their work and develop as professionals.

What's happening in reality?

A good deal of research and commentary focuses on projections of how AI and automation could affect working lives in the future. In this research we provide a different perspective by looking at actual developments in UK workplaces.

Given the potential for AI and automation to shape work and employment, it is crucial to understand what is happening in the organisations where they are being used. Understanding workers' experiences will provide insight into how organisations can maximise opportunities and minimise challenges, both in designing and making use of AI and automation, and in managing employees – successfully recruiting, motivating, developing and retaining people in a fast-changing world of work.

We present evidence that AI and automation are bringing major changes both to what jobs are available and to people's working lives. It is not all doom and gloom, contrary to the predictions of many commentators – there are also opportunities for improvements. But the scale of the impact is undeniable, and far greater than that of other new technologies.

We argue that these changes require managing, and employers need effective people strategies that relate to AI and automation. In general, this does not appear to be happening. We see that many organisations have not considered how they can gain from AI and automation or, if they have, they have not consulted their HR functions or the employees whose jobs are most affected.

Our research approach

Our research draws on both quantitative and qualitative methods. Together, they give us credible insights into how AI and automation are actually affecting working life and what factors make their application successful, or not.¹⁸

First, we ran a broadly representative survey of 759 UK employers using the YouGov panel. This focused on employers' investments in new technologies, in particular, but not exclusively on AI and automation. We explored how they made decisions on these investments, which jobs were affected and the outcomes, both for performance-related factors and for employees' working lives. Further detail on the survey can be found in the accompanying technical report.

Second, we conducted case studies of organisations that have made use of AI and automation, focusing on two in particular: a healthcare provider, NHS Greater Glasgow and Clyde (NHSGGC), which uses robotics to partly automate the distribution of pharmaceuticals; and Atkins, a member of SNC-Lavalin Group, which uses AI and automation in various aspects of its design, engineering and project management work. Both case studies comprised in-depth interviews and surveys of the employees (n=116) affected by AI and automation.

Case study: AI in engineering

Atkins, a member of SNC-Lavalin Group, is a leading multinational design, engineering and project management consultancy. It provides a wide range of services, including in connected and autonomous vehicles, mobility solutions (supporting a move away from car ownership and scheduled services), data analytics (including big data) and networks and drainage (including piping networks, pump sumps and surface water management). Workforce skills and specialisms are varied. The current team has technical expertise in areas including: data collection and analysis; communication networks; tolling, transport planning and smart ticketing; infrastructure resilience; interactions between humans and technology (human factors and cyborg ethnography); hydraulics and drainage; and construction supervision. In addition, it draws on more generic skills in strategic planning and project and stakeholder management. Atkins views its technical expertise and its access to data and the latest technology as important ways through which it develops new tools and processes to improve its services and maintain its position as an industry leader.

Case study: Dispensing pharmaceuticals in acute healthcare

NHS Greater Glasgow and Clyde (NHSGGC) is an NHS organisation that is using robotics to partly automate a specific process, namely the distribution of pharmaceuticals. The case study included four sites. First, a cluster of three acute hospitals have designated pharmacy departments overseeing requests for medicines to inpatient wards, discharges and outpatient prescriptions. Second, the trust has a Pharmacy Distribution Centre (PDC), a warehouse that fulfils all orders for medicine across the trust. The PDC houses the robotic arm that dispenses medicine to order.

Structure of this report

Following this introduction, we discuss the main findings of our research. In Section 4, we investigate the strategies that lead to investing in AI and automation and explore how decisions to invest are made. We then consider the impacts of AI and automation on a range of factors. In Section 5 we look at the impact on the labour market, asking whether robots really are taking our jobs. In Section 6 we look at the impact on job skills; and in Section 7 we consider other aspects of job quality, such as pay, employee autonomy in decision-making, workload and well-being. In Section 8 we look at whether AI and automation achieve the desired increase in performance. We summarise our findings in a final section, highlighting the key learning points from our research.

4 Who and what drives decisions on AI and automation?

Uptake and strategies on AI and automation

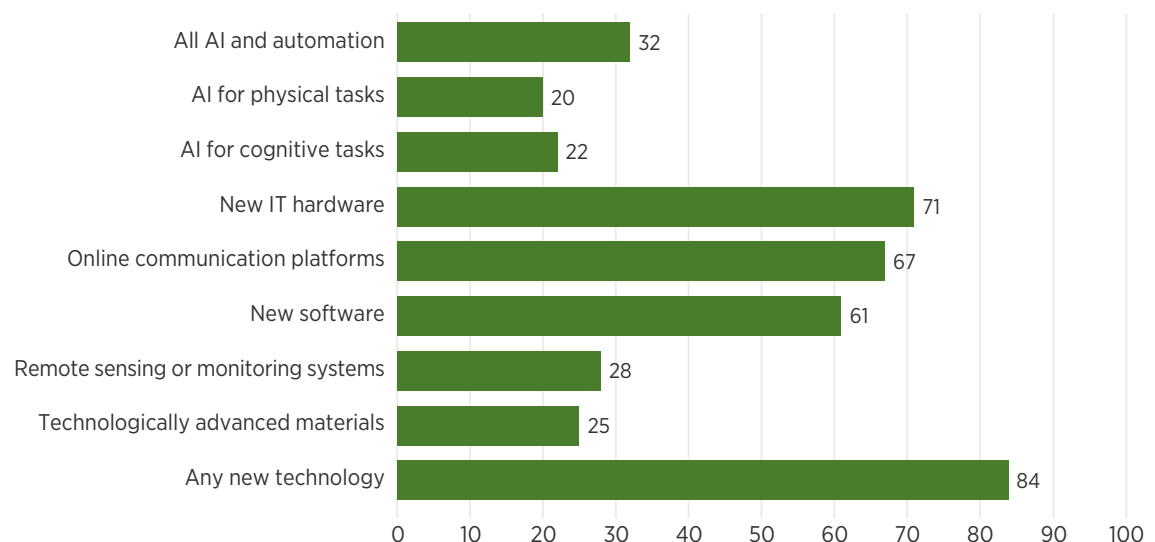
AI and automation have for some time been an emerging technology in business, on the verge of hitting the big time. With this expectation and anticipation come stories of organisations innovating through AI, often challenging established processes or developing radical new approaches. In this section we explore how common it is, the reasons it is and isn't being adopted, and how organisations make these decisions.

Nearly a third of UK organisations (32%) have invested in AI and automation in the last five years.

How common is AI and automation?

Our survey shows that nearly a third of UK organisations (32%) have invested in AI and automation in the last five years.¹⁹ This is split fairly evenly between equipment that's used for cognitive tasks (22%) and for physical tasks (20%).²⁰ The adoption of AI and automation is not as common as the adoption of new IT hardware or online communications platforms, but it is more common than investment in certain new technologies, such as remote sensing and monitoring systems or technologically advanced materials.²¹

Figure 2: Introduction of new technology in the last five years (%)



UK employers (n=759; bases exclude item 'Don't know').

Organisational strategies on AI and automation

Deciding how, when and where to use AI or automation can be tactical or strategic – tactical, being used to replace or reduce human activity in discrete tasks, or strategic, in that it is considered as part of long-term workforce planning. As we move toward an era in which specific skill sets will be increasingly in demand and people's choices in how they want to work are shifting significantly, strategic workforce planning is essential. Organisations must plan how they will deliver their strategy and what capabilities they need to do so. Doing this will allow them to understand where they are likely to have gaps in capability and risk not delivering outcomes.

It has been well noted that people strategies are crucial to delivering performance through HR and people management practice, and that without a clear connection to business objectives, people strategies are likely to fail.²² But to what extent do employers consider technology application as a strategic concern? And from the perspective of people and work, which functions are leading the application of new forms of technology in the workplace?

Three approaches to AI and automation strategy

Technology implementation often represents considerable change in organisations. Whether it's the implementation of a new process, or the modification of an existing process, the impact is likely to be large. As such, the introduction of new technology at scale should be considered a strategic matter for HR and its stakeholders.

Our research points to three strategic approaches to investing in AI and automation. Organisations can adopt these approaches explicitly through plans and actions, or implicitly as a result of unintended actions:

- **Innovation strategy:** employers that adopt this strategy view AI and automation technology in the workplace as an opportunity to innovate and develop new approaches, not necessarily for the purposes of immediate short-term gain, but for long-term sustainability. This strategy is often a build on the instrumental strategy approach, possibly arising from a desire to seek competitive advantage through the implementation of such technology.
- **Instrumental strategy:** employers adopting this strategy tend to view the purpose and outcomes of AI and automation in the workplace on a case-by-case basis, with a specific focus on improving productivity, performance, efficiency and cost measures. This type of strategy may involve rejecting applications of AI and automation – for example, as cost ineffective or risky – but their potential is not ignored. The case-by-case approach may potentially result in short-term and reactive decision-making regarding investments in technology, which has various resource risks associated with it – for example, organisations may be susceptible to low-quality products and make ill-informed procurement decisions.
- **Absence of strategy:** employers adopting this strategy are comfortable with their current business model but lack the impetus to consider alternative approaches using AI and automation. Often these organisations are based on low-productivity, low-investment and low-skill models of employment. In the short term they may survive, but in the long term they may stall from a stagnating approach to such technology. This strategy can involve a conscious rejection of the need to explore AI and automation in the workplace or can reflect a lack of awareness of the potential opportunities.

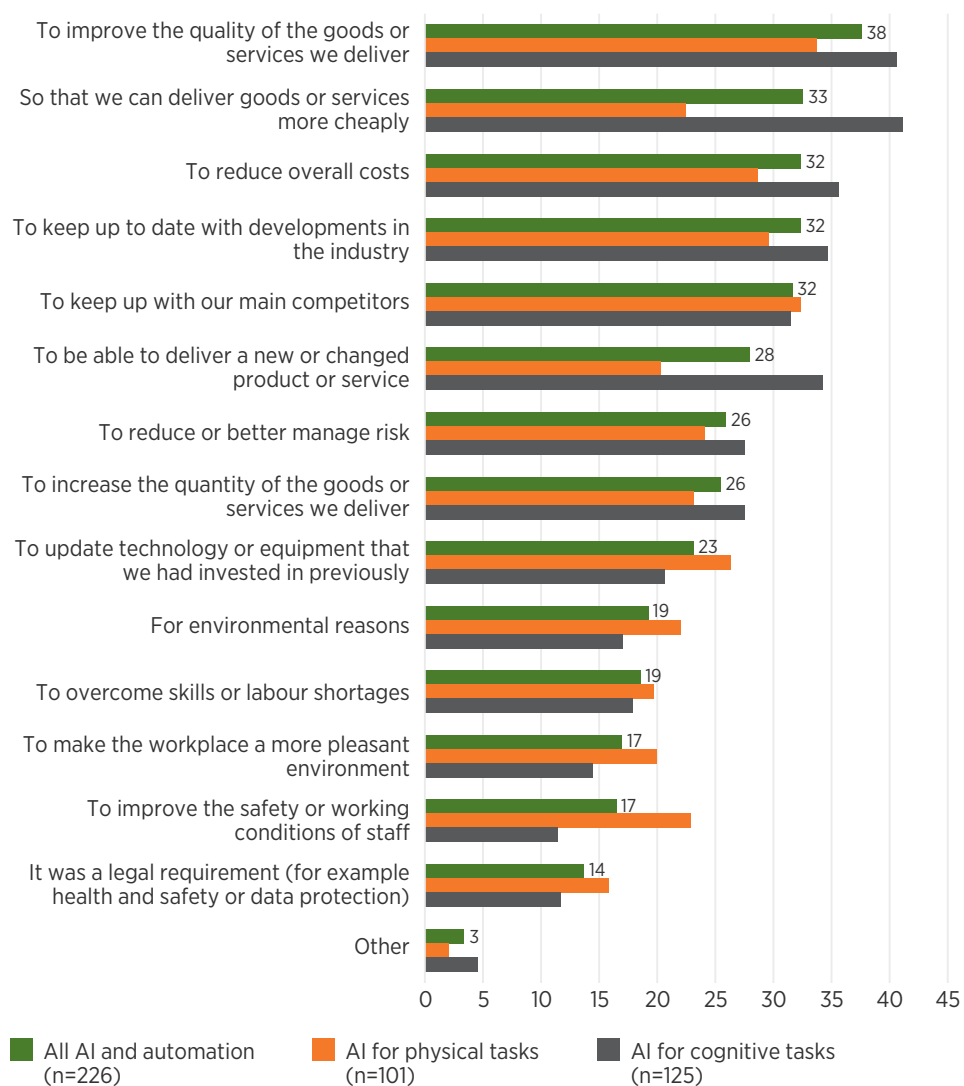
Why are AI and automation being adopted?

Our survey highlights that the most commonly cited reasons for introducing AI were:

- to improve the quality of goods and services (38%)
- to deliver goods or services more cheaply (33%) or to reduce overall costs (32%)
- to keep up with competitors (32%) or the wider industry (32%).

These findings were in line with the motivations for introducing other types of technology, illustrating that AI and automation are being considered similarly, that is, they do not appear to address a unique priority that other forms of technology are not also serving. Further reasons why employers invest in AI and automation are shown in Figure 3.

Figure 3: Employers' reasons for investing in AI and automation (%)



Reasons for not investing in AI and automation

We also sought to understand reasons AI and automation may not be reaching the mainstream. While one might expect that finance was the main barrier – for example, the cost of upfront capital investment, or low rates of return – our research suggested differently. Our findings indicate that the main reasons for employers not investing in AI and automation are a lack of customer or user pressure (33%) and poor awareness of the technologies available and

their utility (30%). Financial reasons are still present – perceived low return on investment (14%) and lack of financial capital (10%) – but these are notably less common reasons. This implies that some employers may yet be convinced of the value of AI and automation, even if customer habits and requirements begin to change.

These findings are also striking because the reasons for lack of investment are often not strategic in nature. It seems that in their technological investments, many employers are neither innovating nor leading customer behaviour. Overall, many organisations are not taking risks in the application of technology, for example in pursuit of competitive advantage. Instead they are more careful and risk-averse to investing in AI and automation technology – even lacking awareness of how the technology is changing.

When we consider the main reasons for not investing in AI by industry type, we see that there are several differences between industries, mainly that:

- A lack of demand among clients/customers is more common in ICT and legal organisations.
- Employers in construction and hospitality and leisure are less aware of any AI and automation that would be of benefit to their organisations.
- Employers in hospitality and leisure and transport and distribution are more likely to cite being happy with the status quo as a reason for not investing in AI and automation.

A lack of technology strategy?

How do these results compare with the three broad approaches to strategy on AI and automation? We found that most organisations investing in AI (75%) apply an instrumental strategy for implementing AI, with this approach being particularly prevalent in the manufacturing industry (81%).²³ Innovation strategies are far less common by comparison, with around a fifth (19%) of all organisations approaching AI investments with this strategic approach. Innovation strategies are relatively more likely in IT, telecommunications and technology services organisations, where just over a third (35%) of organisations take this approach. Only 2% of organisations stated that their organisation lacked a strategy and a further 2% didn't know.

Trends also emerged across sizes of organisation. Organisations of all sizes cited instrumental strategies most frequently (75%), but innovation strategies are more prevalent in organisations of 250–999 employees (23%). Unsurprisingly, we also saw that instrumental strategies are more prevalent in organisations with a range of skill levels (85%), while innovation strategies are more likely to be utilised in organisations with a mostly high-skilled workforce, that is, of university level or higher (25%).

To an extent, one can see a maturity model between these approaches to strategy, as adopting an innovation strategy to AI and automation will include and build on an instrumental strategy. It aims not just to increase value creation within current business strategies, but to realise new forms of value through AI and automation. However, it is important to note that an instrumental strategy on AI and automation is not only justifiable, but may be the most sensible course for many organisations – for example, if they operate simple business models or cannot invest heavily in innovation.

The primary danger lies in the potential complacency of an absence of a strategy. Looking at the most common reasons employers give for not investing in AI and automation, there appears to be a distinct lack of awareness regarding AI and automation and their potential. This could pose risks to such organisations, in that they may fall behind their competitors in technological capability and relevance to their stakeholders, as well as not realising important gains in productivity.

A second danger lies in strategies that do not properly factor in the relationship between technology and employees. Through a human-centric approach, HR can actively propose and support applications of AI and automation that don't overly disrupt the lives of employees and thus have the greatest chance of delivering the organisation's strategy. We discuss this further in Section 5.

Clearly, not all organisations will invest in AI and automation. For those opting against it, we found that the absence of a strategy is more common than not (56%).²⁴ Furthermore, reasons for not investing differ by industry, for example:

- Organisations in the manufacturing industry or retail/hospitality/leisure/transport sector were relatively more likely to report strategic reasons for **not** investing in AI and automation.
- Professional services were relatively more likely than other industries to report semi-strategic reasons for not investing in AI and automation.
- IT, telecommunications and technology services were relatively more likely to report non-strategic reasons for not investing in AI and automation.

We also found that the reasons for not investing in AI also differ according to the size of the organisation. SMEs (organisations with 10–249 employees) were more likely to cite strategic reasons (for example, 'the financial costs outweighed the potential returns' or 'we felt it would have a negative impact on staff') and non-strategic reasons (for example, 'it's more hassle than it's worth' and 'we're happy with the way things are'). Interestingly, larger organisations were more likely to state they do not actually know why their organisation is not investing in AI. This may be a factor of more complex flows of information in larger organisations (individual respondents were more likely not to know) or it may reflect a lack of thought.

Case study: The Atkins story: baking technology into the organisation

The development and implementation of AI and automation can be highly complex and, as a result, emergent and dynamic strategies can work well. Our case study of the design, engineering and project management consultancy firm, Atkins, illustrates this.

Atkins has a focus on innovation and the application of technology central to its business model. Skills that are needed at the workforce level are varied, and include data analysis, communication, design, human factor engineering and strategic planning. These skills play an important role in ensuring that the firm can utilise technology to its full potential.

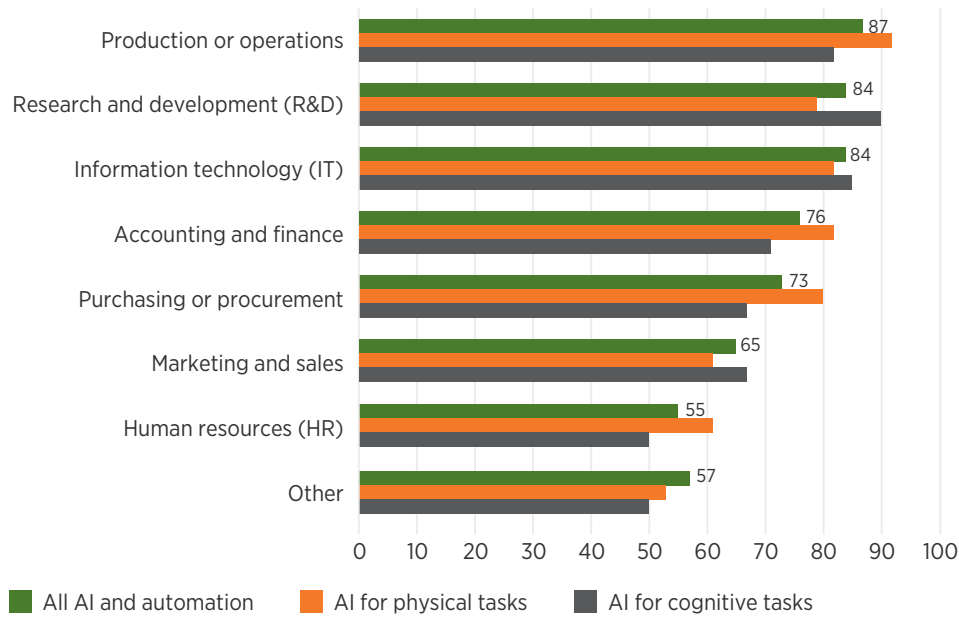
The Atkins strategy for the implementation of AI and robotics is based on a key principle of freeing high-skilled employees for more valuable tasks and redistributing operational gains in the form of improved organisational capability.

The Atkins approach to utilising AI and technology illustrates how various important concepts interlink to drive the adoption of technology in the workplace. In particular, the key concepts of business model, strategy, skills base and firm culture provide a unique context in which the adoption of technology drives efficiency and delivers operational and strategic outcomes. What is most compelling about the Atkins case study is the perspective on AI and automation as an intrinsic capability to the successful completion of tasks, and not roles. This perspective allows Atkins to take a more strategic and considered approach to the content of work, and as such reconfigure and adapt roles and tasks as necessary to drive improvements.

Who drives investment decisions on AI?

The potential impact of AI and automation is far-reaching, so it might be expected that a number of different functions would play a role in the decision to invest in them. However, when we consider the application of specific technology types, such as AI and automation for a range of physical, cognitive or combined tasks, there are a limited number of departments who consistently appear to be consulted in its application (Figure 4).

Figure 4: Departments involved in decision to invest in AI and automation in organisations (%)



Base: UK employers who introduced AI and automation (n=226)

Of the departments we listed in our survey, HR is the least likely to be involved in investment decisions on AI and automation (being involved in 55% of cases). HR is especially unlikely to be involved when the technology is being used for cognitive tasks (50%), which is interesting given that these changes may have greater implications for skill sets required in organisations. There is a strong argument to be made that HR should be involved in decisions that affect roles and therefore should be an instrumental part of decision-making on applications of AI and automation.

For this reason, HR should look to develop the skills and abilities to advise on where AI or automation could provide skills augmentation. Their role should ensure that the implementation of these technologies enables the design of new organisational structures that deliver a more satisfying employee experience.

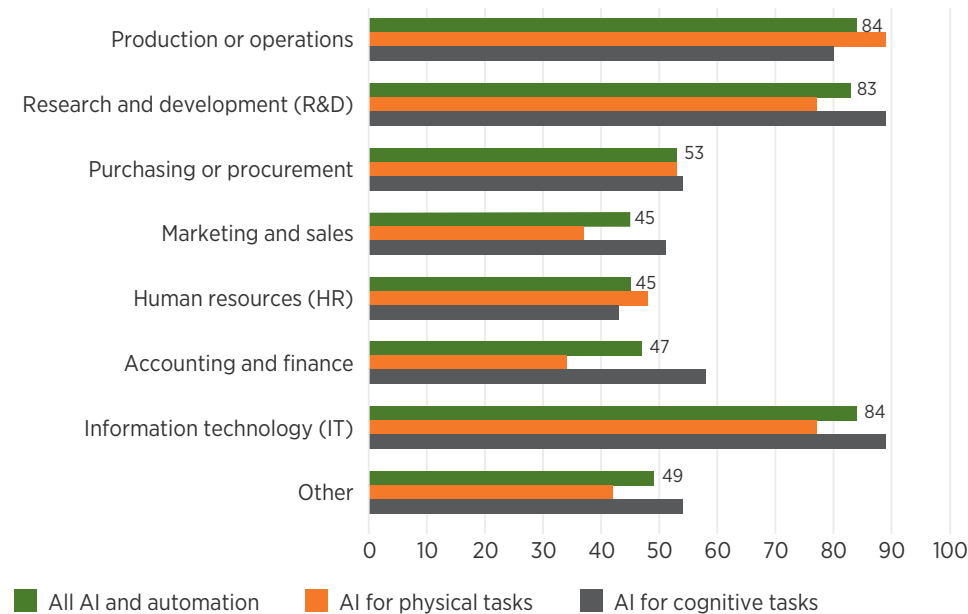
Our survey suggests that the involvement of HR in decisions to invest in AI and automation varies according to both organisation size and industry, although these findings should be considered exploratory given the low number of responses upon which they are based:

- **By organisation size:** HR is more likely to be involved in the decision to invest in AI in small (10–49 employees) or large (250–999 employees) organisations than in very large (more than 1,000) or medium-sized organisations (50–249 employees).
- **By industry type:** HR is more likely to be involved in the decision to invest in AI in the retail/hospitality/leisure/transport industry than in other industries.

Who steers the implementation of AI?

The implementation of AI and automation technology follows similar trends to the decision to apply it (Figure 5).

Figure 5: Departments involved in implementation of AI in organisations (%)



Base: UK employers who introduced AI and automation (n=226)

Departments are involved in the implementation of AI and automation technologies to slightly different extents:

- Production or operations are more likely to be involved in the implementation of automated equipment using AI for physical tasks.
- R&D and/or IT departments are more likely to be involved in the implementation of software using AI for cognitive tasks.

HR is again the least involved function in the implementation of general/combined AI and automation in organisations, with only 45% of respondents noting that HR engages in the implementation process for this technology.

This is a concerning finding in terms of the impact of AI and automation on employees. A negative impact could cause a dip in productivity, well-being or efficacy of the new ways of working. Where HR professionals are involved, a plan for people change, engagement and take-up of new ways of working could increase the value of the investment in AI or automation.

As for investment decisions in AI and automation, our research found a lack of HR involvement in decisions on the implementation of this technology. This would seem to increase the risk that people management and workforce implications are not properly considered, increasing risks regarding the effective bedding in of the technology and negative impacts for employees.

Do employers consult the affected workers?

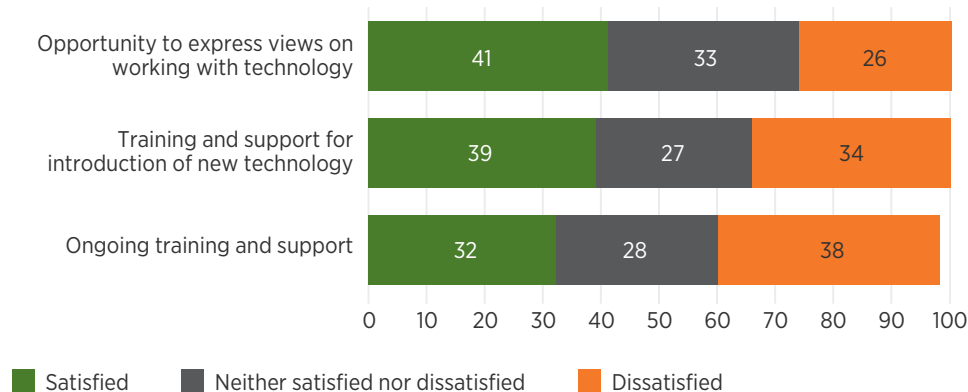
Involvement in decision-making is often cited as an important factor that influences the effectiveness of change. It is crucial that AI and automation have well-designed user-

friendly interfaces that do not distract from the main task at hand or add unnecessary complications to employees' work. Considering these factors as the technology is developed and implemented will help get buy-in from employees and reduce the risk of a system rejection. Employers should treat it as a significant part of organisational transformation. As a manager from one of our case studies commented:

'We had a very strong team structure and we were taking people from all of these strong teams and putting them in a separate place with a whole load of robots. So, their whole work changed. I think some of that is about centralisation and not about the robotics but ... the workforce is key.' (Manager, NHSGGC)

Much depends on the design and implementation of AI and automation, raising the issue of how much employers involve and support their workers. It is important to consult them on the design and implementation to reduce the risk of glitches and unintended consequences, and to provide training and practical support to use the technology effectively. In our case study organisations, we found that levels of satisfaction with these areas was split, suggesting that in all areas more could be done, in particular ongoing training and support (Figure 6).

Figure 6: Satisfaction with support and training for AI and automation (%)



Base: Employees in case study organisations affected by AI and automation (n=116)

As we discuss in Section 6, some occupations are more likely to be affected by AI and automation than others. To what extent are those most affected involved in decisions on investing in and implementing AI and automation?

Encouragingly, our survey of employers found that nearly two-thirds (65%) of organisations introducing some kind of AI or automation reported that the occupational group most affected had been involved in the decision to invest in the technology. Furthermore, more than three-quarters (78%) said the most affected group had been involved in its implementation.

How does HR and trade union involvement affect AI?

We consider whether the successful implementation of AI and automation is related to wider involvement in decision-making. In fact, we found that neither HR nor trade union involvement are related to how successful employers view their uses of AI and automation. It is not clear why this is the case. The finding may reflect the lack of confidence within these groups to inform AI and automation agendas. Alternatively, it may reflect how little expertise or impact either HR or trade unions are currently able to have when AI

and automation implementation is under way. However, despite the lack of a measurable positive impact from the involvement of these groups, we maintain that considering the implications for workers is a vital aspect of AI and automation strategy and planning. It is therefore important to consider if and how HR and trade unions could increase their involvement in AI and automation implementation decisions and the value they could bring to these discussions.

This doesn't mean HR is not important. Our research found that in organisations where HR is involved in either the decision to invest in AI and automation or its implementation, job creation and job elimination are both more likely (being reported in 50% and 57% of cases respectively) than when HR is not involved (37% and 21% respectively). This suggests that where the technologies are used to change the makeup of a workforce, HR is more likely to be brought to the table. A similar 'involvement effect' can be seen for trade unions.

Indeed, this finding may explain why AI and automation is no more likely to be successful when HR or trade unions are involved in decisions: they tend to be involved for the more ambitious programmes that constitute potentially trickier changes in the workforce.

Practical implications

The lack of a strategic approach to the application of AI and automation technology in the workplace is both a significant risk and a substantial opportunity for the HR profession. If HR is absent from key discussions regarding AI and automation investment, this creates a risk of the function being left out of debates that have a real material impact on people and the quality of work.

In the short term, this may result in inefficient and ineffective implementation, but over the long term, HR risks obsolescence on issues directly relevant to modern work. It appears that other functions are more actively involved in technology adoption strategies without the expertise or leadership of HR on fundamental workplace issues. The risks associated with this are manifold: one worry is that HR may lose legitimacy as workforce-related decision-making is eroded to a line beyond the function's boundaries. Finally, and perhaps most worryingly, employees are affected by decisions regarding their jobs that have been made without HR knowledge and specifically without HR's understanding of the ethical tensions arising from the reconfiguration work. It is therefore important that HR leaders pursue an active role in the AI and automation agenda.

The findings do point to a significant challenge for HR. How can it become more influential in strategies and decision-making processes likely to impact people-related aspects of the organisation, such as the design of jobs, the development of skills, or workforce planning?

What can HR leaders do?

An immediate strategic action for leaders in the profession is to understand if and how technology is referenced in the function's people strategy. The three strategic approaches outlined in this section offer a useful tool to orient the direction of the strategy and provide a simple classification for the function's perspective on workplace technology. HR leaders in particular must pay close attention to the strategic and operational actions of other functions with regards to workplace technology, and be mindful of taking the opportunity to shape the application of technology from the very beginning of discussions around planning and implementation.

Reflecting these developments in HR strategy is also important. HR leaders should look to work closely with functions as they begin to embrace new forms of technology and reflect this in various strategic HR practices – workforce planning and learning and development in particular. These practices require HR leaders to consider the organisation’s business model, strategy and stakeholder orientation in detail, and are a good opportunity to consider technology and the potential risks and opportunities associated with it.

Finally, HR leaders must look to understand the changing AI and automation in detail. This can be done by exploring evidence of its impact and developing their own knowledge. As part of this, HR leaders should look to source expertise to advise decision-making by seeking external support in the short term, and building internal capability over the long term.

5 The impact on the jobs market

In Section 4 we presented evidence on employers’ decisions on AI and automation. In this and the following sections, we now consider the impacts of AI and automation on people’s employment prospects, the quality of people’s jobs and performance.

Replace, augment or adjust?

One of the most commonly debated aspects of AI and automation is the impact it will have on levels of employment. The idea that ‘robots will take over our jobs’ is pervasive despite being heavily critiqued.²⁵

A particularly influential study is that of Carl Frey and Michael Osborne, which assessed how susceptible 702 current occupations are to computerisation based on the content of the job roles. Across many occupations – including telemarketers, tax preparers and library technicians, as well as logistics and administrative support jobs – they concluded: ‘*about 47 percent of total US employment is at risk – that is, jobs we expect could be automated relatively soon, perhaps over the next decade or two.*’²⁶

This certainly tells us something, but taking a job-based view can give an overly simplistic picture. As we discussed earlier, we need to look at tasks *within* jobs, as technology tends more often to *augment* jobs and replace *tasks*.²⁷

Another limitation is that it ignores the jobs that will be *created* by AI. Fifty years ago, with a little insight into future technological developments, one might have been able to predict the demise of phone operators, typists or car park barrier attendants, but it is much harder to predict the wealth of jobs that has now been created through the information and digital economy.

US economist David Autor argues that the conclusions of a 1960s commission set up by US President Lyndon B. Johnson still hold true:

*‘technological change ... is an important determinant of the precise places, industries, and people affected by unemployment. But the general level of demand for goods and services is by far the most important factor determining how many are affected, how long they stay unemployed, and how hard it is for new entrants to the labor market to find jobs.’*²⁸

In this way, Autor argues that new technologies act as a jobs boon, because they create increased demand for labour in new ways. Indeed, a more recent paper co-authored by Michael Osborne presents evidence that about twice as many people work in occupations that are likely to grow in number than in those that are likely to shrink.²⁹

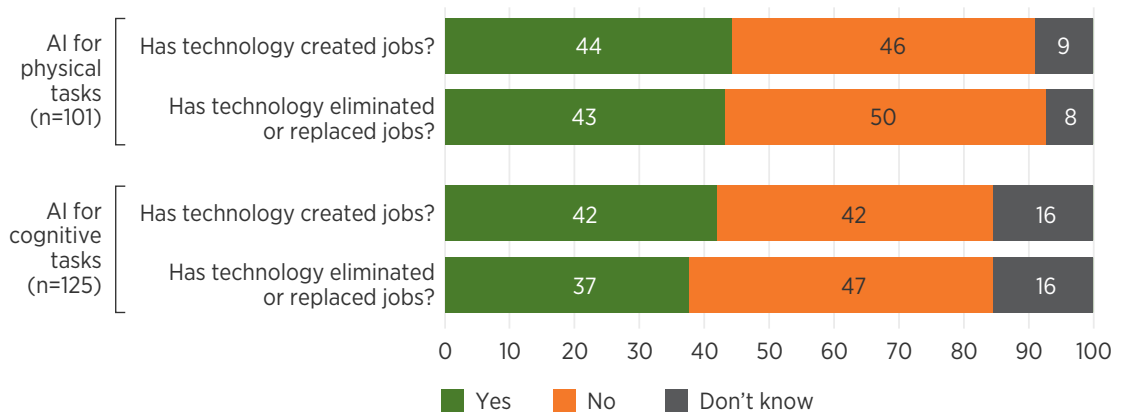
Job replacement and job creation

We add to this macro prospective view by considering the experiences of employers who have invested in new technologies in the last five years.

We find a mixed picture, but slightly more organisations (43%) have seen job creation as a result of AI and automation than job elimination (40%). For physical and cognitive AI, 35% of organisations saw more and 25% saw fewer jobs overall in the areas most affected (others saw no change). Furthermore, 44% of employers introducing AI and automation believed the main jobs affected had become more secure, whereas just 18% said they are less secure.

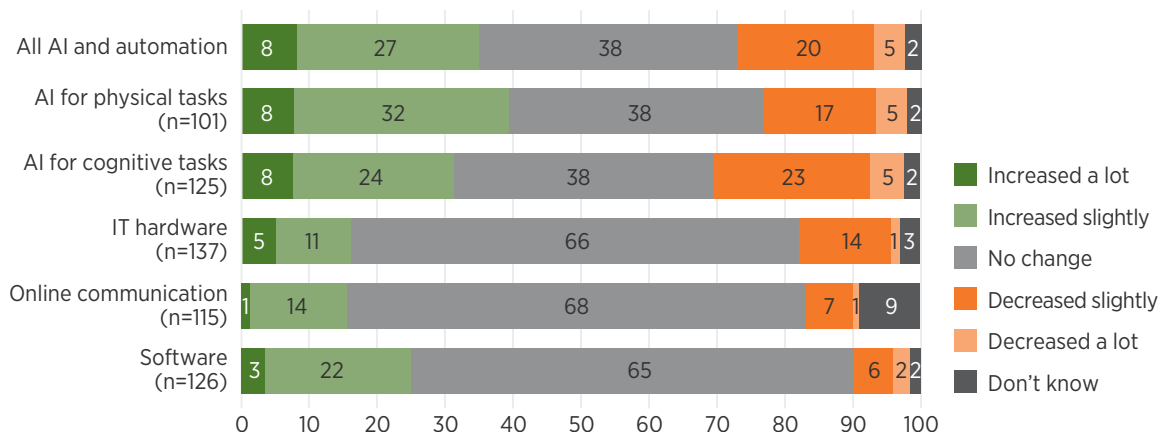
But what is most striking is that AI and automation have had a much greater impact on jobs compared with other new technologies (see Figure 7). This is equally the case for eliminating or replacing jobs as creating new jobs. These findings confirm that AI and automation are not simply another technological innovation, but stand to quite radically change the shape of work tasks and jobs.

Figure 7: Employer views on whether new technology has created or eliminated jobs (% employers who introduced the technology)



Contrary to the common rhetoric that ‘robots are taking over’ our jobs and may lead to mass unemployment, our evidence shows that the picture is more complex. Yet it is clear that AI and automation mark a much greater change in employment than other new technologies. There are jobs that are seen to become less secure or reduce in numbers – especially in the automation of cognitive tasks – so there is a very real risk to manage in getting people up to speed in the skills demand of new jobs. Nonetheless, while the challenges of managing change are significant, the general picture is more positive than negative.

Figure 8: Overall impact of new technology on the numbers of jobs (%)



Who is most affected by AI and automation?

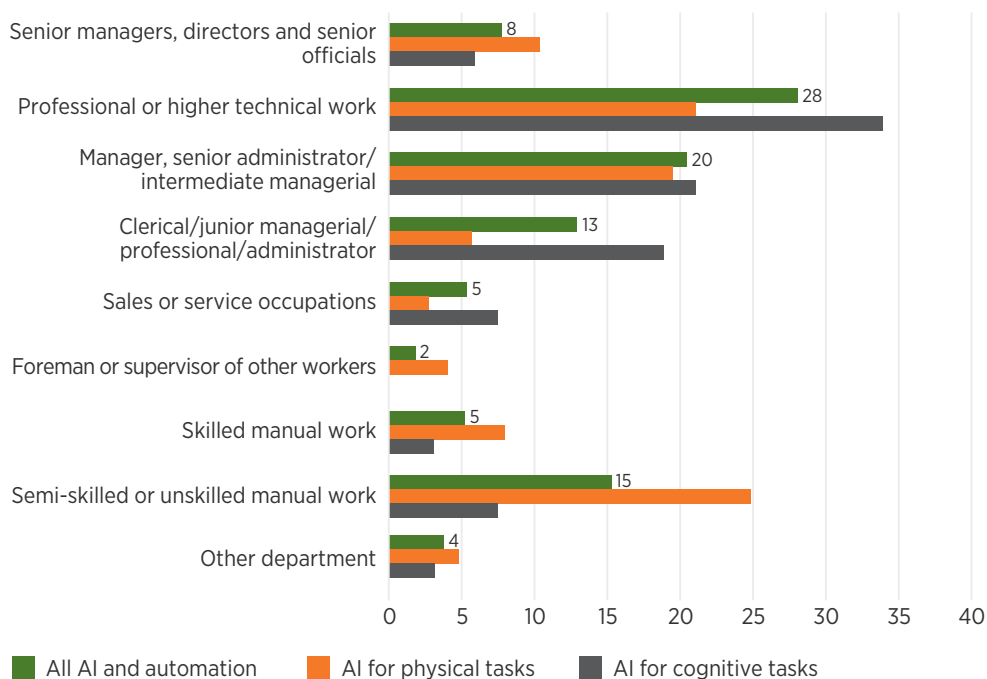
Occupation types

Building on the predictions of research such as Frey and Osborne, we look at which jobs that AI and automation have changed the most over the last five years. When looking at AI overall, for both physical and cognitive tasks, those most likely to be affected are:

- **professional and higher technical staff** (28%), described as staff that require at least degree-level qualifications – for example, doctors, accountants, schoolteachers, university lecturers, social workers and systems analysts
- **intermediate-level managers and administrators** (20%), for example finance managers, personnel managers, senior sales managers and senior local government officers
- **semi-skilled and unskilled manual workers** (15%), for example machine operators, assemblers, postal workers, waiting staff, cleaners, labourers, drivers, bar workers and call centre workers
- **junior managers and clerks** (13%), for example office staff, student doctors, sales persons, clerks, secretaries and student teachers.

Unsurprisingly, as can be seen in Figure 9, these overall figures mask some of the variation between AI for physical tasks and AI for cognitive tasks. In particular, professional and higher technical workers and clerical and junior managerial staff are far more likely to be affected by AI for cognitive tasks than physical. And conversely, semi-skilled and unskilled manual workers are far more likely to be affected by AI for physical tasks.

Figure 9: Which types of job have been changed most by AI and automation? (%)

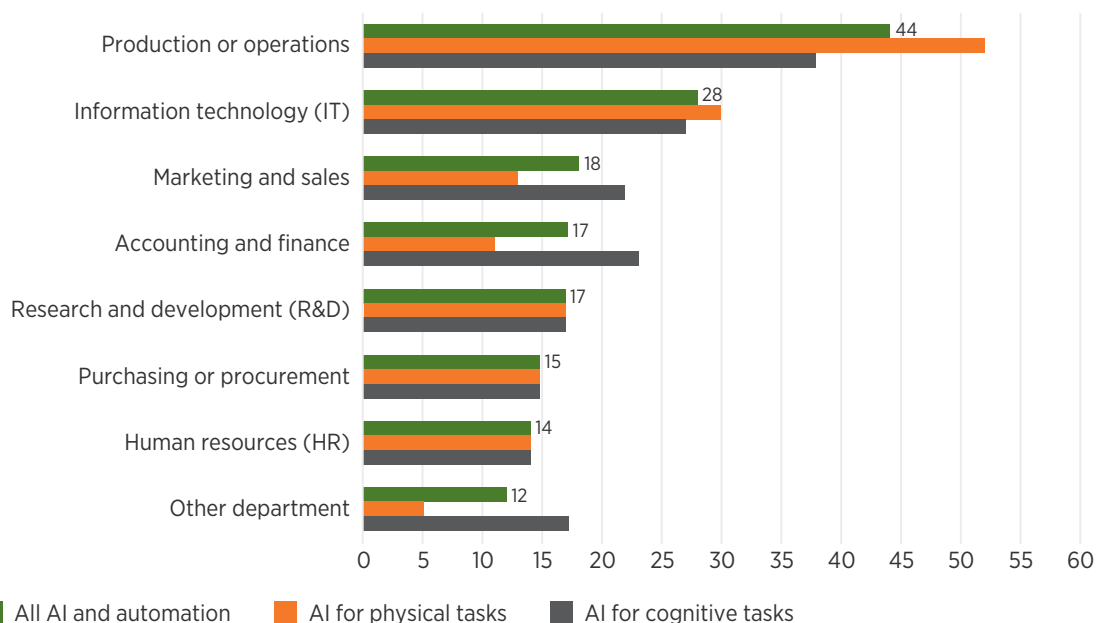


It is also important to note which occupations have been least affected to date by AI and automation. In particular, supervisor roles stand out in this regard, perhaps because of the central aspect of managing people. To a lesser extent, sales and service occupations also remain relatively untouched, perhaps because they are strongly customer-facing, as do skilled manual workers, whose work centres on craft skills.

Organisational departments

In terms of which organisational departments are most affected by AI and automation, quite some way in front are production and operations. Nearly half (44%) of organisations that invested in AI and automation saw changes here, with IT departments the second most likely to be affected (28%). A follow-up question on which departments were *most* affected by the introduction of AI and automation confirms this broad trend.

Figure 10: Departments affected by the introduction of AI and automation (%)



Base: UK employers introducing AI-enabled technology (n=226; % shown for those organisations which have the department in question)

Is AI changing the role of HR?

As with many functions that involve administrative tasks, HR has activities that look ripe for the picking in the use of AI. A primary candidate is recruitment, in particular sourcing and rating applicants, but there is also potential in learning and development activities and fielding employee enquiries.³⁰

However, our research suggests that there is more potential than impact to date. Applications of AI and automation to HR processes have so far been relatively uncommon and less far-reaching in their impact than for other departments, such as operations and IT. One in seven organisations (14%) saw impacts on the HR function and even fewer employers introducing physical or cognitive automation reported that HR is the most affected department (7% and 4% respectively).

This does not mean a lack of changes to come and there do appear to be opportunities for HR to use AI and automation to improve its ability to serve employee well-being and organisational performance.

Practical implications for HR

For most lines of work, the picture of how AI and automation is shaping jobs is positive if complex. But the degree of change – and the care with which it should be managed – is not in doubt. The introduction of AI and automation marks far greater changes in employment and the nature of jobs than those we see from other new technologies. These changes need to be designed and managed in an effective way for AI to be successful, both for the business and, as we discuss in the following sections of this report, for employees.

When it comes to the HR profession itself, not only does the HR function tend to play a peripheral role in overseeing AI and automation, but it is also less likely to have these technologies implemented in its own work.

HR leaders do have opportunities to improve various HR services through AI and potentially free up their specialists to focus on more value-added tasks. However, to date the greatest impacts in UK organisations have been in operations and, to a lesser extent, IT functions. It will be interesting to see how much HR and other departments follow suit over the coming years.

6 The impact on skills

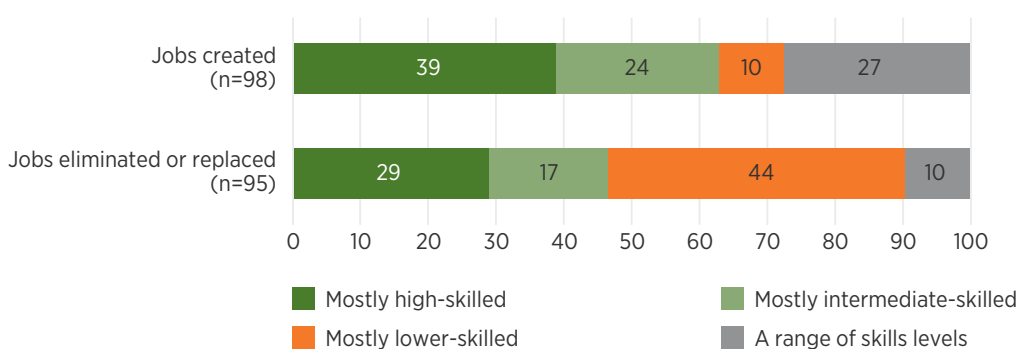
One area of change for employers to manage is the skills required in jobs. For example, people whose jobs are affected by AI and automation may not have the skill set needed to make proper use of the new technology and may struggle to adapt to the demands of new jobs. In this section, we discuss this issue and the need for reskilling or making different use of people’s skills.

How automation is shaping skills in the workplace

As discussed in Section 5, AI and automation are playing a role in both replacing and creating tasks and jobs. An important question that follows is: what types of jobs are being affected and are these jobs becoming more or less skilled?

Overall, we find that AI and automation are having a net upskilling effect on UK jobs. We see that many more low-skilled jobs are being replaced than are being created, and most of the new jobs are either high-skilled or a range of skill levels. A net upskilling effect is apparent both when AI and automation are used to automate cognitive tasks and for physical tasks, albeit in slightly different ways: *cognitive* automation is the more likely to create high-skilled jobs and *physical* automation is the more likely to replace low-skilled jobs.

Figure 11: Skills levels of jobs created and replaced by AI (%)



This change in the quantity and quality of skills in the workforce is clearly changing the nature of the labour market. Automation presents a particular challenge in that there are numerous scenarios for skills in the wider labour market, but there are two, somewhat contradictory trends that may result from the application of technology in the workplace. We found that AI in particular is shaping the content of jobs in specific ways:

- More than half of employers implementing AI and automation (61%) found that staff needed more skills and knowledge as a result.
- Two-fifths of employers found that AI and automation gave employees more control over working hours. This compared favourably with most other technologies, which tended to have no effect on control of working hours.

AI, when compared with other types of technology, such as new IT hardware, online communications platforms, and new software, also appears to be making jobs more complicated, more likely to require upskilling and more likely to lead to increases in pay for individuals.

Reshaping tasks: more complex and interesting work

A strong body of research highlights job quality as a critical component of a productive and healthy workplace.³¹ In this regard, it's clear that the impact of AI is multifaceted, affecting the content and quality of work, as well as having an impact on the complexity of jobs in some circumstances.

Our case study research showed that AI is reshaping work for employees, leading to some improvements such as more interesting, complex and varied work:

- **Learning new things:** 43% of employees surveyed in our case studies said they spend more time on learning new things, compared with 6% who spend less (others saw no change).
- **Interesting tasks:** a third (33%) of those surveyed in our case studies noted that there is an increase in the number of interesting tasks they are tackling, with 6% noting a decrease.
- **Monotonous tasks:** half (50%) of respondents noted that the number of monotonous tasks they are doing has decreased, while 15% saw an increase.
- **Complex tasks:** over a quarter (28%) of respondents stated that they are completing more complex tasks following AI implementation, while 13% of respondents saw a decline in the number of complex tasks they are completing.

Alongside this we note instances where AI and automation present new opportunities for employees to develop by enabling them to learn new skills and capabilities, an important component of job satisfaction:

'It's helped to have something new, to see something through from the beginning.... It's helped to motivate me to have something that I've got a bit more knowledge about, and to pass on that learning ... I feel a bit of job satisfaction from that.' (Non-managerial employee, NHSGGC)

This evidence suggests that there are positive impacts to be had from AI and automation on employees' skills and potentially career development. It cannot be taken for granted, however, as these opportunities need to be managed and employees appropriately supported so that they can adapt to job changes and create more value for the organisation. These are questions of people strategy that present a strong business case for HR teams to become more involved in leading the investment and implementation of AI and automation.

In general, the technologies tend to replace a certain task, rather than replace a whole work process from start to finish. This means that it requires human interaction and handoff, which sometimes decreases the overall efficiency:

'I think from what I've seen so far, in terms of when organisations try to automate systems, what they want to do is try and make things more efficient and to try and reduce the number of people: so working on a specific task or in a team. What tends to happen is that they'll automate one part of the task and they'll actually require more people to manage the problems that have come from the automation or when the automation doesn't work or managing the other steps that the automation creates.'
(Non-managerial employee, Atkins)

For AI and automation to be successful, they need to be designed in relation to the humans who integrate them with wider work processes. Understanding the complexity of an organisation's work processes and what drives performance in specific jobs – questions of strategic HR and organisational design – are crucial elements in this.

The effect of automation on skills gaps

How AI and automation affect skill levels of jobs is an important part of the debate on their impact. Yet the influence here can be two-way: labour market conditions affecting the uptake of AI and automation. On this point, our survey shows that among employers introducing AI or automation, around a fifth (19%) are doing so to address skills gaps or labour shortages.

Looking at how these two factors combine, if we consider those organisations in which addressing skills gaps motivated the investment in AI and automation, we find that they are no more likely to have *created* new jobs but are more likely to have *eliminated* jobs.

Is AI shaping training and workforce planning?

Given how we see AI shaping some aspects of skills in the workforce, one might expect that AI is a stronger influencer on workforce planning or investment in training than other forms of technology. However, our data shows that this isn't the case. In particular we find:

- Those organisations which reported introducing AI were no more likely to state that they have increased training investment than those who introduced other forms of technology. The introduction of new software or new IT hardware is more likely than the introduction of AI to result in investment in training.
- The majority of organisations surveyed stated that they have engaged in some level of workforce planning, but there is no real evidence to suggest that those introducing AI are more or less likely to engage in workforce planning compared with those investing in other forms of technology (78% compared with 81%).

Practical implications for HR

As the internal skills landscape of organisations is reconfigured by the application of technology, so too are the management practices designed to support and enhance the productive use of skills in the workplace. Aspects of human capital management, including workplace planning, learning and development, and people management all require reconfiguration within an augmented technology environment. This requires capabilities particular to HR, organisational development, and learning and development professionals, and as such offer an obvious role for them to play.

HR will need to consider how AI implementation will shape the types of jobs that are completed, and how individuals can be supported to engage in more complex and varied work, alongside AI and automation. These changes may also affect aspects of job quality as a result, as tasks within jobs are reshaped. To enable this, HR leaders should look to build the capability of the function to understand the implications of technology on tasks and roles throughout the organisation. Developing the function's knowledge on the topic will enable greater participation in technology debates as and when they arise.

Overall, employers, led by the HR function, should focus on the following:

- Understand skills requirements and develop effective workforce planning. HR and employees' representatives also have a role to support employees directly in focusing their development and giving them the support they need to adapt for the future.
- Clearly map workforce-related risks of automation and AI.
- Explore the changing role of the HR function and build capability from an opportunity perspective (less managing risk, more exploiting new opportunities).
- Enhance L&D provision to prepare the workforce through different forms of learning.
- Manage the change process to effectively engage and prepare employees at all stages of the implementation.

However, at a wider social and economic level, this is a responsibility that must be shared, and there is a clear role for government in devising appropriate skills policies and interventions. The strategies to tackle the UK's systemic productivity challenge have long focused on skills from the supply side (education and training), much to the detriment of the demand (workplace) side. Government policy, by focusing on demand, has missed an opportunity in calibrating skills that fit the needs of modern UK businesses.³² AI and automation have potential to help remedy this complex issue, as these technologies may free employees to make better use of their skills and therefore upskill organisations. In turn this may lead to gains in organisation performance (see Section 8).

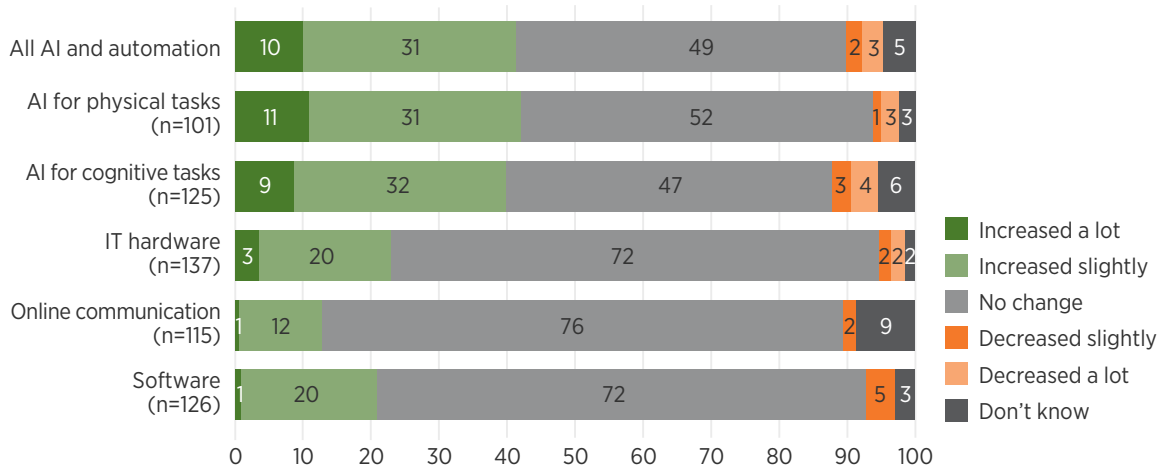
7 The impact on job quality

We have discussed the impacts of AI and automation on the jobs market and, related to this, the skills required. We now turn to how AI and automation are shaping other aspects of job quality. Specifically, we explore how they are affecting pay, employee autonomy or empowerment, workload and the pace of work, and employee well-being.

Impact on pay

We saw in the last section how AI and automation seems to be having an upskilling effect on jobs overall. Consistent with this positive picture, we see evidence of a net increase in pay. This comes from our survey of employers, which suggests that those most affected by AI and automation have a good chance of seeing their pay increase. While it is more normal for pay to remain unaffected (49% across all AI), two in five employers (41%) reported pay increases. This may be related to the requirement for them to undertake more complex work. It is noticeably more than for other forms of new technology and much more than the proportion of employers who said people earned less as a result of AI (see Figure 12).

Figure 12: Employer views on the impact of AI on pay (%)



Autonomy and empowerment

A common fear of AI in the workplace is that it will usher in a Big Brother era in which employers monitor workers' every move.³³ Monitoring can be of great benefit in certain environments – for example, in transportation, drivers' fatigue levels can be assessed (automatically in real time), improving safety.³⁴ However, surveillance that is seen to be excessive can threaten the psychological contract, and the fear is that AI and automation will bring an insidious growth in surveillance that quickly becomes invasive and controlling.³⁵

But such a change is far from inevitable. Most employers already have a reasonably extensive ability to monitor employees' activity through their use of email and the Internet. And, as any HR practitioner could tell you, the degree to which monitoring capability is exercised is not dictated by the technology in place, but is in large part down to the degree of trust there is in the workplace. In short, employers have agency and choice in this matter.

Our survey asked employers about the degree of autonomy or empowerment that employees have in day-to-day work decisions. The findings indicate that, on balance, there is greater autonomy, not less. We find this both for employees' control of their work hours and the tasks they do. These benefits are notably more likely for AI and automation than they are for other new technologies when it comes to employees' influence over working hours (they are more similar when it comes to controlling job tasks).

Figure 13: How new technology affects employees' control over working hours (employer views) (%)

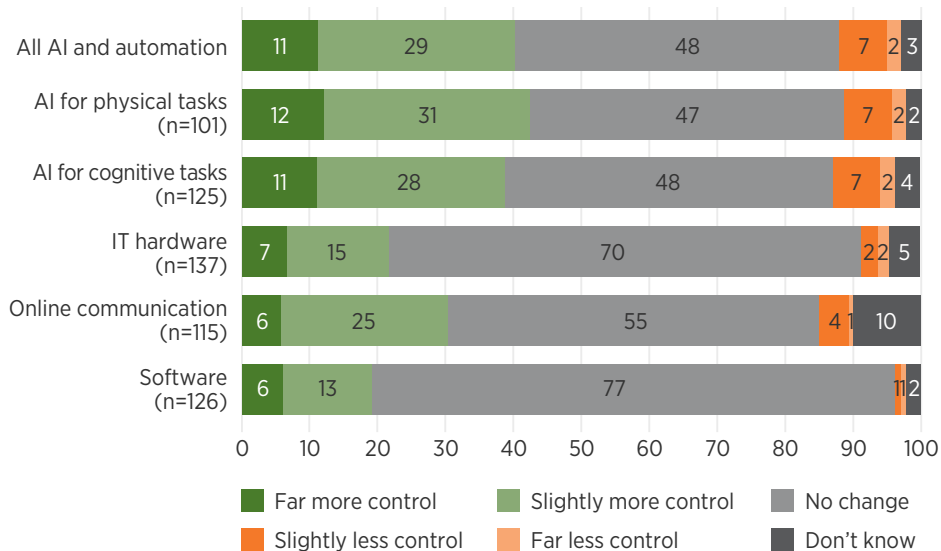
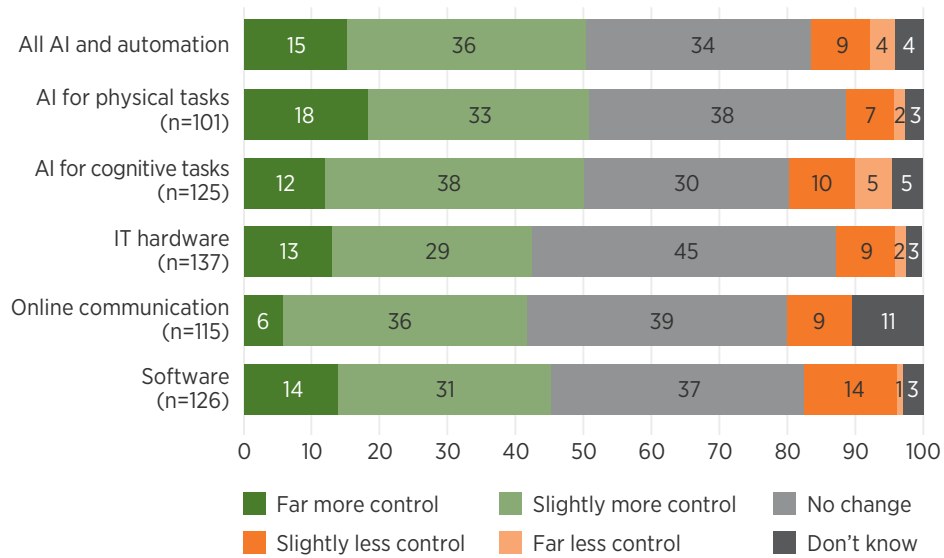


Figure 14: How new technology affects employees' control over job tasks (employer views) (%)



Job intensity and workload

Separate from the autonomy people have in their roles, we consider the pace and intensity of their work, which research shows have increased over recent years for many UK jobs.³⁶ Do AI and automation play a role in this?

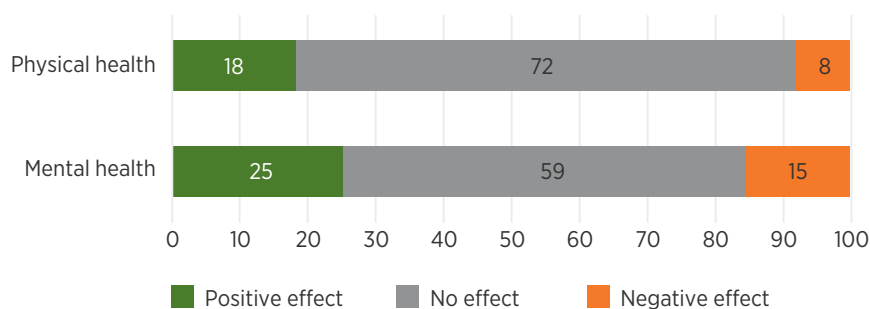
We considered the experiences of employees themselves through the surveys in our case study organisations, Atkins and NHSGGC.³⁷ Overall, employees saw little change in workload, but a faster pace of work. Specifically we found:

- One in four (24%) experienced a decrease in their workload, with the same proportion experiencing an increase (23%; others noted no change).
- Respondents were similarly split on how AI and automation have affected the mental demands of their work (28% increased, 25% decreased).
- The physical demands of work have been eased by AI and automation (31% reporting it reduced, 11% that it increased).
- Regarding the pace of work, more respondents reported that AI and automation makes their work faster (45%) than that the pace of work has slowed down (16%).

Employee well-being

Aside from this mixed picture, we see signs that AI and automation can contribute to well-being at work. Although most saw no impact, a fair proportion of employees in our case studies reported a benefit on their health and well-being. The positive impacts here could be due to a number of factors, not only the pace and intensity of work, but also how interesting and well paid it is and the career development opportunities it provides.

Figure 15: Impact of AI and automation on well-being (employee views) (%)



Practical implications for HR

Our research shows that there is potential in principle for AI and automation to impoverish jobs, for example, deskilling them and making them less interesting and fulfilling. However, according to employers, what is much more likely is that jobs are *enriched* by AI and automation and employees are freed from mundane tasks to focus on more value-added or creative tasks. This is the case for pay, worker control and also for physical and mental well-being, despite an increase in the pace of work for many. These findings may relate to another trend: the tendency for AI and automation to give employees more influence over their work. We know from an established body of research into job demands and resources that autonomy or empowerment is an important psychological ‘resource’ that helps people deal with pressure.³⁸

We cannot take these benefits for granted, but employers and HR practitioners should see them as realistic opportunities. Organisations can simultaneously pursue strategies for AI and automation and better working lives or job quality.

Indeed, these two strands are not just compatible; they may mutually support each other. The benefits to employees will mean that they are more bought into the changes that the technology needs to be successfully embedded, helping the wider transformation process.

HR practitioners can use these findings to position their organisations’ use of AI and automation in a way that strengthens employer brand: as well as being seen to be in the vanguard of work innovation, these technologies can be seen to enrich people’s working lives and ultimately help their careers.

8 The impact on performance and productivity

In Section 4, we identified increased performance – in particular improvements in quality and cost savings – as the main driver for investment in AI and automation. We now ask: do these technologies have the desired effect on performance? We consider different levels of evidence, including macro-economics, employer views and the experiences of employees.

A tale of two cities?

Since the 2008 global financial crisis, productivity has remained low globally, but some countries have fared better than others and divisions between firms appear even more pronounced. The OECD estimates that between 2001 and 2013, the top 5% of firms saw productivity growth of 40%, while average growth for the other 95% was just 5%. The Bank of England has found similar results, with the gap being especially large in the UK because of the large tail of underperforming firms, which it attributes in part to the role of poor management.

The OECD suggests that this is linked to the imbalanced adoption of AI and automation. It is not unusual for new technologies to be adopted by a minority of firms and then gradually spread across within sectors, but so far there is little sign of the usual catch-up happening with AI and automation. This may be because, compared with previous technologies, they require much larger investments and wider-ranging changes in business models.

Part of the reason for a widening divide between the ‘haves’ and the ‘have-nots’ is likely to be the capital needed for upfront investment in AI and automation. Another reason is differences in the organisational environments in which they are implemented. In particular, the OECD argues that the contribution of AI and automation to productivity growth depends on technology investments being combined with complementary investments in knowledge-based capital assets – for example, skills and innovations in work process.³⁹

Here we turn to the experiences of UK employers that have invested in AI and automation. What benefits have they seen in performance?

Performance benefits of AI and automation

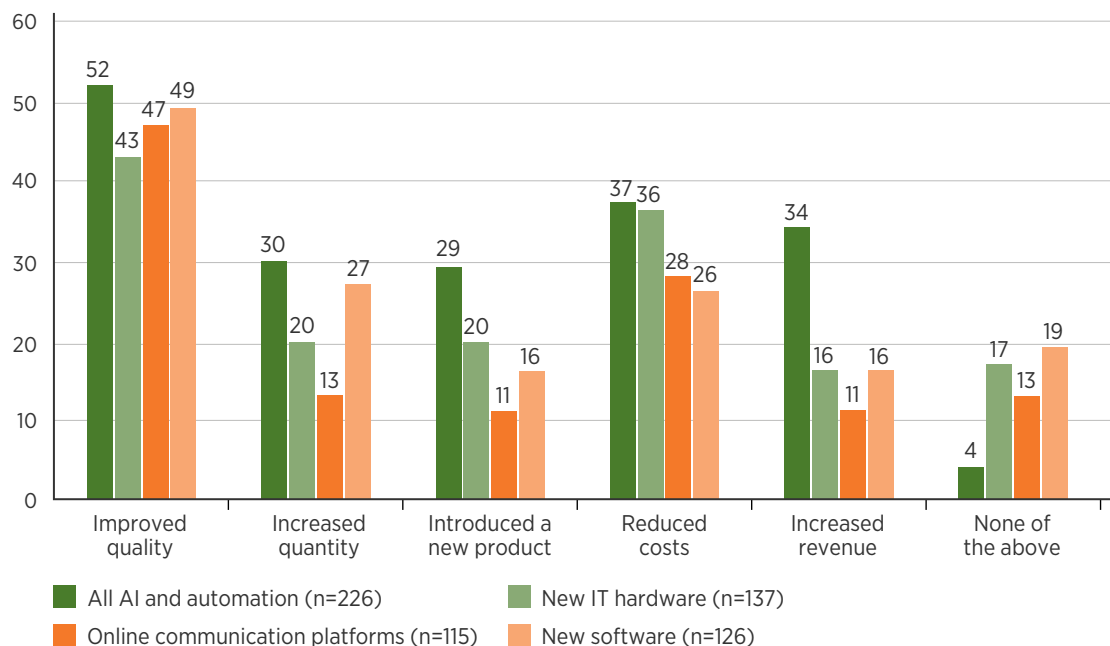
Our survey finds that employers generally see performance benefits from AI and automation. They are much more likely to increase revenue than other technologies and, combined with the potential for reduced costs, this points to a major opportunity to improve organisation productivity.

In particular, as shown in Figure 16, the most commonly cited outcomes of introducing AI and automation were:

- **Improved quality of goods and/or services:** half of employers (52%) who invested in AI and automation saw this benefit. It is especially common when AI and automation is used for physical tasks (57%, compared with 48% for cognitive tasks).
- **Reduced costs:** more than one in three who invested in AI and automation saw this (37%). In this case the benefit is especially apparent for those using them for cognitive tasks (42%, compared with 32% for physical tasks).
- **Increased revenue:** one in three employers (34%) saw an income benefit from AI and automation.

They are also more likely to see benefits in introducing new goods or services and in the quantity of output. Very few investments in AI and automation saw no benefits (2% for cognitive tasks, 6% for physical tasks), especially when compared with other new technologies.

Figure 16: Outcomes of new digital technologies (%)



Base: UK employers introducing a new technology (n=644)

Performance gains in a distribution centre

Our case studies illustrated some of the performance benefits identified in our survey. Through its use of robotics to **dispense pharmaceuticals**, NHS Greater Glasgow and Clyde (NHSGGC) saw reduced stockholdings and storage space, reducing its pharmacy budgets, and substantial time savings from automatic stock reports and reminders for restocking. This resulted in a faster execution of service, speeding up delivery of medicines and patient discharge.

Overall, the robots made the work of the Pharmacy Distribution Centre faster with fewer errors, and enabled it to extend its services, making medicine available more hours of the day and accessible to a wider range of staff.

Performance gains in engineering

Our case study at Atkins pointed to various ways in which AI and automation are benefitting engineering processes.

One of these regards **visually diagnosing defects**, a vital aspect of maintaining pipe networks. Atkins needs to review CCTV footage covering tens of thousands of kilometres of pipes to identify leaks, misalignment and intrusions. In the past, this was a labour-intensive manual job, a single network often taking a team of technicians several months to review. To take on this task, machine-learning algorithms were initially run in real time, observing technicians reviewing pipe networks, then run automatically, being corrected by humans and learning from each correction. By the fourth pass, the AI had 96% of the humans' accuracy and picked up on additional defects that humans would have missed. It now runs at ten times normal speed and is expected to become more accurate than humans. This AI is now also being applied to other contexts, notably diagnosing potholes and cracks in pavements and roads.

Another application of AI at Atkins has involved **extracting and aggregating data** for land development. Developers need a range of information on the availability of utilities and related factors, such as the condition of hydraulics for water supplies. In the past this information would be manually sourced from different datasets, but Atkins now uses an off-the-shelf bot application that accesses and aggregates the necessary data. This is a highly beneficial application, yet it is relatively simple. Machine learning is not needed, as the target data is predefined. The bot simply performs repeatable rules.

Can AI and automation hamper performance?

Our case study research showed that the impacts of AI and automation on performance can be mixed, sometimes including drawbacks despite the general performance gains from AI and automation. Negative experiences of AI and automation included:

- an overload of tools and repetition of work
- technical limitations of AI and automation – that is to say, they may be relied upon for more than they can effectively deliver. This is a particular issue when the sizable investments in AI and automation mean that there is sometimes an expectation to use them, regardless of their efficiency

- maintaining the technology creates additional tasks or a need for further complementing technologies – the worst of these impacts is the frustration with technical glitches, errors and breakdowns that lead to extra effort through workarounds or repair work
- the noise level could distract employees, or additional tasks could disrupt their workflow.

A fundamental reason these challenges can occur is that, as already noted, a characteristic of AI and automation is that they tend to replace specific tasks and *augment* rather than replace human roles. This means their effective use relies upon human interaction and integration with a wider range of jobs. The devil is in the detail. Such complications may make the difference between organisations seeing new levels of performance from new technology or being better off without it entirely.

Technology won't drive performance alone. The benefits rely not just on AI and automation changing how tasks are carried out, but also on the management systems and practices that surround employees' work. As such, HR can take a proactive approach and work with operations managers to review the drivers of and barriers to performance; these insights can then be used to develop AI solutions that don't just look good on paper, but are sustainable in practice.

Mixed views from employees

What performance insights do we get from the workers whose jobs are most directly affected by AI and automation? Employees in our case study organisations were asked about the impacts of AI and automation on their ability to undertake specific tasks. This too provided a mixed view. On the one hand, employees pointed to clear overall benefits in a number of areas, in particular in performing predictable physical tasks and collecting data for work. On the other hand, at a broad level, most employees did not think that the introduction of AI and automation in their jobs has generally helped their in-role performance.

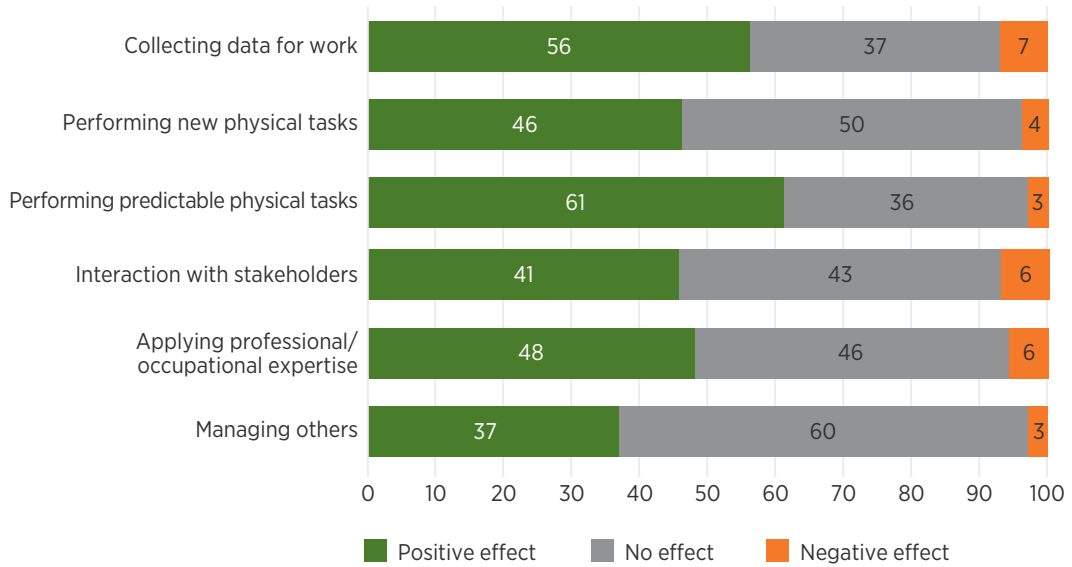
These findings are summarised in Figures 17 and 18. For example, we see that about three in five workers (61% and 56% respectively) said that introducing AI and automation has had a positive impact, whereas just less than one in ten (3% and 7%) said that their performance of these tasks has worsened. Yet only 28% agreed that AI helps them do their job better.

Trust and resistance

The reasons for this discrepancy are not clear, but it may be that the benefits are incremental and have yet to be seen at an overall level. Another part of the explanation may lie in the trust employees have in AI and automation and the time it takes for them to get used to it. We found, for example, that trust is lower in Atkins – where employees are using AI in a range of contexts and tasks – than it is in NHSGCC, where robots are used in a specific set of pharmaceutical tasks.

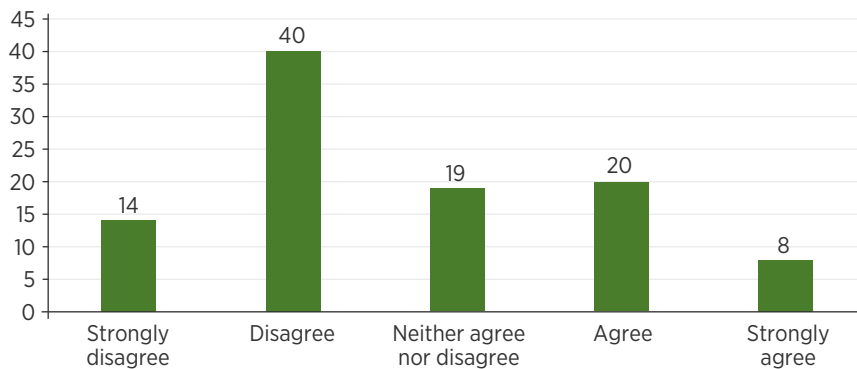
Historical accounts of innovations as diverse as printing, margarine, recorded sound and transgenic crops show that people tend to view major change with suspicion.⁴⁰ This can lead to resistance to changes and even active sabotage. Even if they are well designed and applied in a relevant way, there may be resistance to AI and automation, quite simply because they can represent a major change in how people work. HR can leverage its ability to understand the hearts and minds of employees to advise the design, implementation and communication of the new technology. Doing so will help employees rebuild not only their work practices, but perhaps the narratives too through which they see their value and place in the organisation.

Figure 17: Worker perceptions of the impact of AI and automation on task performance (%)



Base: Employees in case study organisations affected by AI and automation (n=116)

Figure 18: AI or automation ‘helps me do my job better’ (%)



Base: Employees in case study organisations affected by AI and automation (n=116)

Practical implications

As AI and automation are production technologies, there is a perception that they will drive performance; however, this cannot be taken for granted. Poor design or implementation of AI and automation will greatly affect their impact and potentially create barriers to productivity.

Technology alone will not drive performance; performance depends on the broader systems and people management that shape jobs. At the heart of the effective application of AI and automation lies an understanding of how people will carry out tasks and interact with new technology. Getting the people-machine interface right is crucial.

Linked to this, we must not forget that the performance gains of AI and automation will be related to other areas of organisational life, such as job design and skills. These aspects are interconnected, because it is employees who need to implement new technologies and people can be fearful of changes. This is especially so in the case of AI and automation, as they can be unknown quantities and there has been much negative

press about ‘robots taking our jobs’. However, our research has shown some positive impacts from AI and automation on employees’ working lives – which go hand in hand with performance benefits. Employers should look to leverage this opportunity where possible.

Equally, by gaining a deep understanding of the relationship between people and technology, employers can manage important risks and enablers in AI and automation. Employers should avoid design that does not account for how work is organised, or how tacit knowledge is used. They should also be cognisant that negative perceptions can cause resistance and that a lack of skills and knowledge of the technology can be a barrier to the realisation of benefits.

These points create a strong case for centrally involving both HR professionals and the affected employees in the design and implementation of AI and automation. Unfortunately, our research shows that this is not happening at the moment: their current involvement is only peripheral. Nonetheless, they are well placed to understand the broad implications for designing jobs and managing people, as well as how work processes combine and succeed at the ‘coalface’.

HR and people professionals can play various central roles in AI and automation. These include providing training and support for employees whose roles are affected, consulting them on implementation and understanding their attitudes towards it. The HR function should take a proactive approach in this and work with other business leaders to review both the drivers and blockers for performance. This challenge is not limited to AI and automation. It is part of a far wider question of how the HR and people profession can realise the potential of its unique position and strengthen its strategic role through a strong focus on enabling people’s performance.⁴¹

Finally, looking beyond the level of the organisation, there are also implications for government policy, especially given the UK Government’s industrial strategy to improve productivity and enhancement. Government can usefully encourage employers to adopt AI and automation where relevant and practicable, and vitally, encourage these applications to be supported by good people management.

9 Conclusion

This research has investigated employers’ applications of AI and automation in practice to shed light on how these new technologies stand to affect work. Our research adds insight to the existing body of knowledge, much of which is based on predictive modelling for the future. A future focus is necessary in this area, especially given the rapid pace of developments in AI. But considering that one in three employers report that they have invested in some form of AI or automation in the last five years, it is now timely to consider the applications to date.

Technology: tool, not master

Our research highlights the dynamic two-way relationship in how AI and automation manifest within organisational contexts. Technological developments create new opportunities for how work is carried out, but employers are very clearly agents in any transformation that takes place through AI and automation.

There is no inevitable impact of AI and automation on employees, but we do not support the doom-mongers' predictions of a general slide towards heightened control of workers and impoverished working lives. Rather, we present evidence that the scale of change implied by AI and automation for jobs is great – far greater than for other new technologies. This is something that needs actively managing through a concerted people strategy.

We find, for example, that AI and automation are potentially deskilling and disempowering, but they are more likely to free people to do more value-added, higher-skilled tasks and exercise more discretion in decision-making. Our survey suggests that while the greatest drivers for AI and automation are business focused – in particular to improve service quality, reduce costs and keep up with competitors – they can also deliver real benefit for workers themselves.

We see this as a basic question of employer strategy and choice. The discourse of 'robots taking over our jobs' ignores the fact that, ultimately, technology is an extension of people, not the other way around. AI and automation will make it unnecessary for people to carry out certain tasks, but this can free them to do higher-skilled, more value-added tasks instead. How employers make use of these wider opportunities depends on the quality of the organisation's people strategy.

More broadly, we can see this as an example of how different factors combine to shape working life. As we argued in previous CIPD research, influences on jobs such as new technologies don't work in only one way, as their impact – both risks and opportunities – depends on context.⁴² For example, just as the combination of AI and people strategy informs its impact on employees, so too the combination of new technology, employment regulation and skills demands can lead to very different outcomes for 'gig workers', who may feel either disempowered and insecure in their work or in a strong position to manage their work flexibly. In short, there are a range of factors that will influence how our working lives are shaped by new technology.

The role of HR and people strategy

For these two reasons – the range of potential benefits and risks in AI and automation and the importance of a connected people strategy – it is crucial that HR plays a leading role in workplace applications of AI and automation. As our research shows, AI-based technologies appear to be having a greater impact on work and business outcomes than other technological investments. These impacts involve changes in people's work and, as such, the HR function is uniquely placed to help.

For example, there are performance gains to be had in AI and automation not only through cheaper processes and improved quality, but also more widely through the better use of skills. Fundamentally, it is an issue of workforce planning – that is, considering how people management and related areas such as recruitment and career development fit with technology strategies.

This is central HR terrain. Unfortunately, HR appears to be playing no more than a bit-part role in these developments. This is the case not only for decisions to invest in AI and automation, but also in implementation. In both these respects, they are among the departments least likely to be involved in decisions.

There are clear ethical issues related to the application of technology that HR must play a role in navigating with the workforce. These may be multifaceted, complex issues that require a high degree of knowledge about the work relationship, which arguably only effective HR functions possess:

'I think it does always raise an ethical question, the technology that we go into and what is it being used for and why are we doing it? I've often been frustrated, vocally, that there have not been enough of the questions being asked when we invest in working on a new technology: what are the ethical implications? Are we just following the market, blindly, because that's where the money is, or are we doing something to make sure that the technology we do look at has a positive impact on communities and users? My well-being in that sense might be affected, but not in a direct sense.' (Non-managerial employee, Atkins)

HR functions need to be involved, and not as a subservient support function, but as a strategic player. From our conversations with HR professionals, many seem to lack confidence as they are not technological experts in AI. Such hesitation is understandable and, in order to contribute fully, HR and related professionals may need to familiarise themselves with technological developments in their organisations' operational field.

However, we would also argue that HR practitioners should not feel that they need to become experts in AI and automation. They can be confident in playing a strategic role in this area by bringing the discussion back to core HR terrain. A degree of technical understanding will be needed, but these discussions need locating in people strategy and workforce planning.

Benefits, risks and enablers

What, then, can we learn from the range of impacts of AI and automation? To date we see evidence of more positive than negative impacts. As one might expect given the drivers of AI and automation, employers tend to focus on performance-related benefits – in particular in service quality, but also in costs and revenue. And while employees in our case studies show some ambivalence about the impact on their overall performance, they do see benefits in a number of specific tasks.

Certainly we do not uphold the doom-monger line that AI inevitably impoverishes jobs.

Opportunities for mutual gains in AI and automation

There is a connection between what makes for the successful use of AI and automation from a business perspective and the impact on employees' working lives. Far from it needing to be one at the expense of the other, organisational performance and job quality can be complementing factors.

One example of this potential win-win scenario is that AI and automation can lead to faster-paced work, yet can also give employees greater autonomy and control over their work, a factor that helps them manage increased demands. Overall we see evidence that emerging technologies in Atkins and NHSGGC lead to more interesting, complex and varied work.

We also see that the successful implementation of AI and robotics relies both on the technology being ready and fit for purpose and employees being ready with the appropriate levels of skills and support. Thus, a user-centric approach to the design of the solution is more likely to ensure acceptance at rollout and the development of a minimum viable product that can be tested and has greater employee buy-in.

Skills gaps: solutions or further challenge?

There is a complex relationship between AI and automation and skills. On the one hand, addressing skills gaps emerges as an important driver for investment in AI and automation. On the other hand, introducing AI and automation changes the skills make-up of jobs.

To date, UK skills policy has focused on the supply side of skills – for example, through training schemes and apprenticeships – but the greater challenge that the UK faces is in the *utilisation* of skills.⁴³ As such, investment in AI and automation may help employers address some of these issues, contributing to the high-skill ‘high road’ that the UK economy needs.

Our case studies confirm that training and support for the use of new technology are key enablers. They also highlight the importance of good design and the risk of technical glitches, which create stress for employees and compromise performance. Thus, another crucial enabler is the involvement of the employees whose jobs will be most affected by AI and automation in their design and implementation.

Unfortunately, as with the HR function, we see a lack of involvement of the employees most affected by AI and automation. Even for low-skilled roles, this would seem to be a mistake. For the time being almost any technology – even those that include machine learning – needs to be applied by humans, and it is those workers at the ‘coalface’ who will often be best placed to highlight potential glitches and additional opportunities to make use of technologies and innovate. This again is something on which HR functions can take a lead, working with communications teams to involve employees and give them a meaningful voice.⁴⁴

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Issued: April 2019 Reference: 7755 © CIPD 2019

