The economic impact of digital inclusion in the UK

A report for Good Things Foundation

July 2022

Supported by:

Capita

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Authorship and acknowledgements

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Forward

Digital Inclusion: Is it key for the UK's economic growth?

Digital skills are essential for most of us in our everyday lives - and the Covid 19 pandemic has significantly changed the way we all live and work. It led to an acceleration in the adoption and application of digital technology which has been transformative for both people and businesses - and the majority of us have used technology to reduce isolation to access up-to-date health information and to help our children to learn.

However, the less familiar story of the pandemic is that although digital exclusion has reduced overall, the divide itself has worsened, with the most vulnerable lagging further behind. There was a large increase during the pandemic in the numbers of people that only had partial digital skills, and there is evidence that isolation and lack of consistent support meant some lost or forgot those skills that they had previously gained - particularly amongst over 65s. In addition, there are 2 million households that struggle to afford internet access in the UK today. This will only increase as the impacts of the increased cost of living begins to bite.

The pandemic didn't create the digital divide - but it did expose and exacerbate it. Fixing the digital divide is an urgent priority.

We need to act now and we need your help to take the necessary steps to overcome digital exclusion, overcoming all the barriers including skills, motivation and confidence, and access. Without further additional intervention, 5.8 million people are estimated to remain digitally excluded by the end of 2032 - 3.7 million in the over 75s age group.

Digital inclusion remains an urgent issue in the UK. It is crucial for the UK's economic success, and for the Government's ambitions to level up, as this report sets out. Giving everyone in the UK the digital skills they need to not only survive, but to thrive too, will be crucial to the UK recovering from the effects of the pandemic, as well as weathering the storms of the cost of living crisis in the UK.

We will see just shy of a £10 return for every £1 invested in interventions. The case for investment is strong - with the government set to realise £1.4 billion through efficiency savings alone, plus £483 million in increased tax revenue, with the NHS expected to save £899 million in addition. It is hard to argue against the case for investment in digital inclusion.

People who still need support to gain digital skills are becoming harder to reach, and there is a need for more intensive and sustained support for those who aren't yet online, or risk losing their skills. We need to act now to reach them.

For the first time in this year's report, we have made the assumption that not everyone will and can get online. This represents a growing understanding of the excluded population, and the barriers and challenges they face, so it feels like a sensible and realistic decision that will allow us to focus our efforts on those who are willing to improve their skills - and who can benefit the most.

Our new strategy, published earlier this year, sets out how we will build and strengthen a national social infrastructure for digital inclusion, providing devices, data, and digital skills learning. We want everyone, everywhere, to be able to access the friendly, local support they need to benefit from the digital world.

Through this infrastructure - the National Databank, National Device Bank, and National Digital Inclusion Network - we will look to partner with organisations at national, regional and local level to extend digital inclusion to as many communities as possible. A range of other organisations are delivering excellent work in digital inclusion, and this will continue. And we continue to look to the Government to invest in digital inclusion, so that more people can be supported.

For all organisations, at every level, understanding the economic return on investment in digital inclusion is crucial. We hope that this new report, in partnership with Capita, provides essential data and narrative on the economic impact of digital inclusion that all organisations can draw from.

This report sets out clearly the benefits to the UK of giving everyone the digital skills they need - and I hope this report is compelling for government, the private sector and others to make the commitment to invest in Fixing the Digital Divide - once and for all.

Thanks to Capita for their support in commissioning this important piece of evidence which I hope will have a significant impact on closing the digital divide.

Helen Milner, OBE

Good Things Foundation

Introduction

The content of this report includes the findings of Cebr's 2022 study on the economic impact of Basic Digital Skills and inclusion in the UK. This constitutes Cebr's third report for the Good Things Foundation on this subject with previous editions conducted in 2018 and 2015. The findings in this report are consistent with the Lloyds Banking Group Essential Digital Skills framework and the Consumer Digital Index.

We define a digitally included society as one in which everyone[1] has at least a basic level of digital skills. The purpose of this research is to establish the expected benefits and costs associated with minimising digital exclusion in the UK. In this refresh of the report we have used the Lloyds Banking Group defined measure of 'Essential digital Skills (EDS) for life' as our definition of 'basic digital skills'. We use these terms interchangeably throughout the report. Our research has been conducted in the format of a cost benefit analysis, establishing the number of adults who require support to achieve EDS for life, the costs associated with individuals gaining this level of skill, and the resulting monetary benefits for the UK economy from the required total investment in training.

The purpose of this year's update is once again to recalculate the economic value of digital inclusion. The benefits and costs associated with individuals across society acquiring Basic Digital Skills are measured and compared so as to assess the net benefits. This leads to an updated estimate of the net benefits of undertaking the necessary steps to realise this goal. The results are presented both in terms of the net present value to the UK society and economy and the cost-benefit ratio.

Digitalisation of UK companies has accelerated during the COVID-19 pandemic, as many were forced to work from home due to lock down measures. As businesses continue to further extend their use of digital technology, it will become even more imperative that workers have the skills to take part in a more digitised work environment. This is crucially important if productivity gains are to be realised. Benefits from these productivity gains will be felt in both the private and public sectors. For instance, the UK Government will see increased revenues and see further efficiency savings. Despite recent progress, however, not everyone has become digitally included. The UK's numerous lockdowns and associated social isolation experienced by many, led to loss of skills and reduced opportunity to gain new skills, for some. As a result, the gap between those with and without essential digital skills has widened, within the context of an increasingly digital society.

The pandemic has shown that the future of work is a hybrid one where people can work from home or other locations should their jobs provide the potential. This opens opportunities for people to live in a wider array of places, which can mean them being better able to support local communities. However, without sufficient digital skills, workers will have limited scope to take full advantage of this recently accelerated trend.

There are a range of barriers to digital inclusion which our society needs to tackle. Research for the UK Digital Strategy suggests that there are several important barriers, and more than one may affect individuals at any one time.

- Access - not everyone can connect to the internet and go online
- Skills - not everyone can use the internet and online services
- Confidence - some people fear online crime, lack trust, or don't know where to start online

1 It is recognised that there may be a residual number of persons who will never gain digital skills, for instance, due to old age.

- Motivation - not everyone sees why using the internet could be relevant and helpful

Some sections of the population are more likely to be digitally excluded than others and this report highlights how trends have changed amongst the digitally excluded since the 2018 report. The Lloyds Essential Digital Skills report 2021 shows that those worst affected by a lack of digital skills are those over the age of 65, persons with physical impairments and those with no formal qualifications. Geographical location also plays a key role. Those in rural communities tend to have less strong provision of high-quality internet connections. Digital skills are one of several elements required to ensure those in rural communities and those who are vulnerable can fully utilise the internet that can often serve as a lifeline.

Scope and methodological overview

This report estimates the current level of digital exclusion within the UK, and the different streams through which digital inclusion can benefit the UK economy. The cost benefit analysis covers the 10-year period of 2023 to 2032; estimating the costs and benefits of ensuring that as many people as possible within the UK are fully digitally included by the end of 2032. The scope of this study includes:

- **Costs of Inclusion.** We utilise raw data from the ONS and Lloyds Banking Group to estimate the current number of people in the UK who do not have basic levels of digital skills.[2] We then create a projection of the number of people without basic digital skills at the end of each year and identify out of this total the number and profile (taking age and disability into account) who will require digital skills training from 2023 to 2032. Using data provided by Good Things Foundation, an estimate is made of the costs of training these people.
- **Computation of the monetary benefits of digital inclusion through nine benefit streams.** Eight of the benefits streams analysed are the same as within the 2018 version of this digital inclusion report, although some of the methodology has been updated to increase robustness. The economic benefits of CO2 reduction, associated with remote working as a direct result of digital upskilling, has been added as an additional benefits stream. This has replaced the communications benefit stream.
- **Effects of the COVID-19 pandemic.** These are estimated through the inclusion of a 'nowcast' which estimates the number of people who have gained a basic level of digital skills annually from 2019 through 2022 in a way assumed to be independent of any training. The benefits associated with this increase have been calculated for all nine benefit streams. This section is not part of the cost benefit analysis.

2 For methodological consistency, the Essential Digital Skill for Life measure from the Lloyds Banking Group report is used. They also measure against Essential Digital Skill for Work.

1. Executive Summary

This section details the headline results of Cebr's analysis of the economic impact of digital skills inclusion in the UK.

- A significant number of people gained basic digital skills in recent years, partially because of the COVID-19 pandemic and associated lockdowns, **causing the number of digitally excluded people in the UK to fall from 12.4 million at the end of 2019 to an estimated 11.5 million** at the end of 2021. By the end of the current year, we estimate the number of adults without basic digital skills will fall to 10.6 million.

- Although the number of people without basic digital skills has been on a declining trend, **without further intervention of digital skills training, 5.8 million people are estimated to remain digitally excluded by the end of 2032**, with 3.7 million of them in the 75+ demographic.

- To achieve full digital inclusion by the end of 2032, 9 81[3] thousand people will need to gain basic digital skills each year from 2023 to 2032. An estimated 474 thousand will gain digital skills annually without training due to the existing downward trend. This **leaves 508 thousand who will require digital training annually. These figures factor in an estimated 750 thousand people** by the end of the ten-year period who we assume will either never have gained basic digital skills or gained but not used digital skills (i.e. 'lapsed use' for a variety of reasons.

- The result of our analysis is a cost benefit ratio of 9.48, indicating that for every £1 invested in digital skills training, £9.48 is gained throughout the economy. The associated net present value is £12.2 billion.

- Those with digital skills are expected to place less pressure on the NHS, by reducing the number of in person GP appointments they attend. By estimating the number of fewer appointments each person receiving digital skills support is likely to make as a direct result of being upskilled, we are able to quantify savings that the NHS is likely to make with a fully digitally included UK. **We estimate that NHS savings will total £899 million over the appraisal period.**

- **The UK Government will save an estimated £1,355 million over the 10-year period in efficiency savings,** from those being digitally trained increasing their usage of government transactional services online as opposed to in person, through phone calls or paper-based communications.

- It is estimated that over the 10 years from 2023 to 2032, providing digital training to 508 thousand people annually **will generate £3,906 million in total savings through the time savings benefits stream.**

3 Figures are subject to rounding.

- Those who have a basic level of digital skill, equivalent to Lloyds Banking Group EDS for life will be capable of conducting daily tasks such as shopping online. As a result, these individuals will benefit from the use of online price comparisons and save money as a result. Through minimising digital exclusion in the UK by 2032, **we estimate that those who receive training annually will save a total of £3,480 million through reducing the costs of their retail transactions.**

- Monetary benefits generated by corporations filling vacant positions as a direct result of those receiving digital skills training each year from 2023 to 2032 will amount to **£2,719 million in total over the 10-year period.**

- By creating a breakdown of those receiving digital skills training each year by economic status, we estimate the number who are likely to enter the workforce as a direct result of receiving digital skills training annually from 2023 to 2032. We then calculate the corresponding increase in earnings. **Over the 10-year period this will lead to additional earnings of £179 million in total through the employment benefits stream.**

- Those who are employed and receive digital skills training, becoming digitally included, are likely to see a resulting earnings increase. **We estimate that the monetary value of this, aggregated over the 508 thousand who will receive digitals skills support annually from 2023 to 2032, is £586 million in total from 2023 to 2032.**

- Through an increase in earnings of those employed and receiving digital skills training and those who gain employment because of training, we estimate the increase in government tax revenue using an in-house model. In addition, we factor in the reduction of job seekers allowance payments to those who are estimated to gain employment because of receiving digital training. **We estimate the total value of this to be £483 million over the 10 years from 2023 to 2032.**

- By providing digital skills training to 508 thousand people from 2023 to 2032, CO2 emissions are likely to fall as a result of these people having the ability to work remotely. **Over the 10-year period we expected the monetary value of CO2 reduction to total £76 million**.

2. The increasing importance of digital inclusion to the UK economy

The number of people in the UK who have never used the internet continues to fall year on year. In 2020, there were 3.6 million people in the UK who had never used the internet and 0.8 million that only use it occasionally. By comparison, in 2018, these figures stood at 4.5 million and 0.9 million people, respectively.[4]

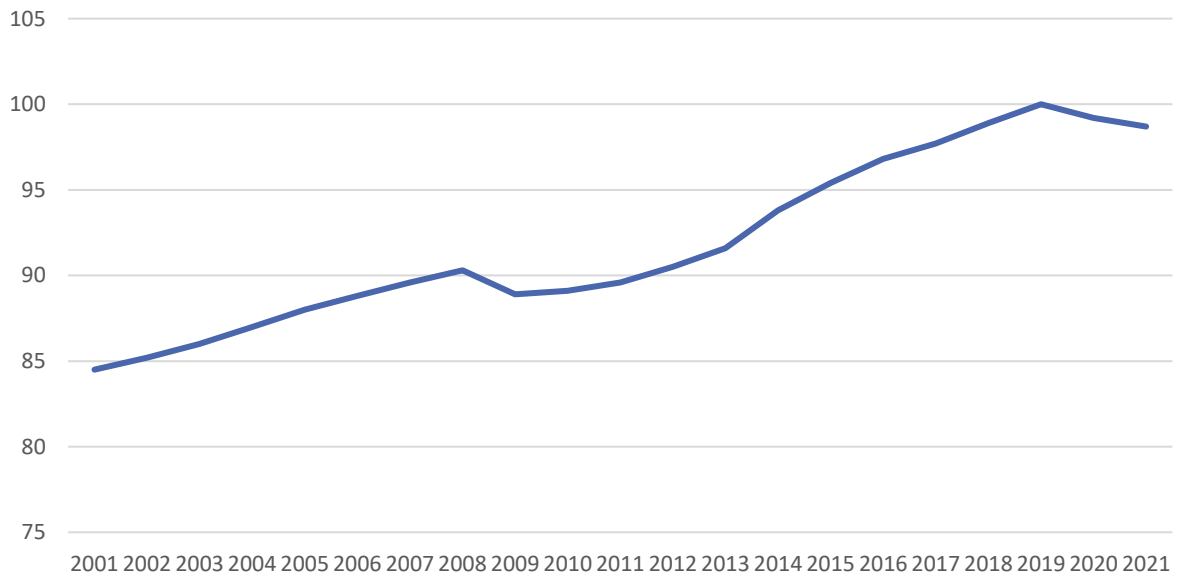
This section outlines the importance of having a digitally included population for the UK economy and is broken down in the following structure:

- The importance of digital skills in driving productivity;
- The impact of technological change and automation on the future of work;
- The growing influence of the internet on sales in the UK retail sector; and
- The cost and efficiency savings government stands to gain from providing access to public services through the internet.

2.1. The importance of digital skills in driving productivity

Achieving a digitally inclusive society is particularly relevant for the UK. As seen in Figure 1 below, in the aftermath of the financial crisis, productivity fell considerably and failed to recover to above its pre-crisis peak until 2012. Whilst there was a gradual recovery in the years following, there is a notable peak in 2019 and uncertainty remains about levels of productivity that can be achieved in the post-COVID-19 economy.

Figure 1: UK labour productivity (output per worker) from 2001 to 2021, Index 2019 = 100



Source: ONS[5]

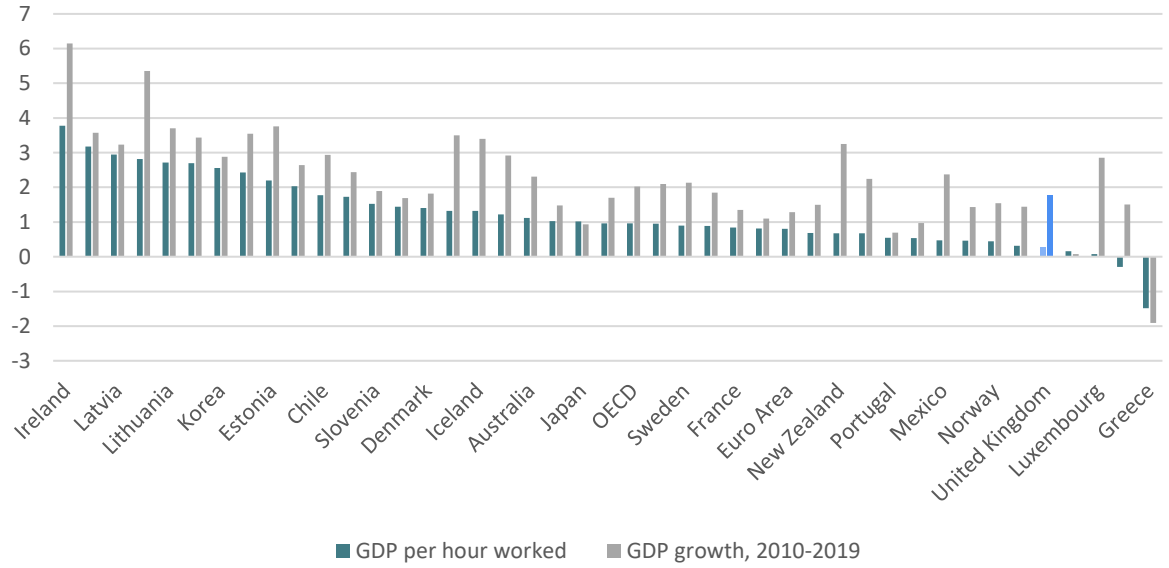
4 ONS (2021), Internet Users

5 ONS (2022), Labour Productivity Time Series

Despite the gradual recovery between 2009-2019 displayed in Figure 1 on the previous page, the UK still lags behind many of its peers in terms of productivity. The UK services economy contributed towards 80% of total UK economic output (Gross Value Added)[6] and 82% of employment in April-June 2021.[7] It is therefore essential that the UK achieves strong productivity growth to remain competitive in the international marketplace within service-related sectors.

Currently, the UK ranks poorly compared to other OECD economies in terms of productivity growth rates, as seen in Figure 2 below.

Figure 2: OECD Productivity and GDP Growth rates 2010 – 2019, %



Source: OECD[8]

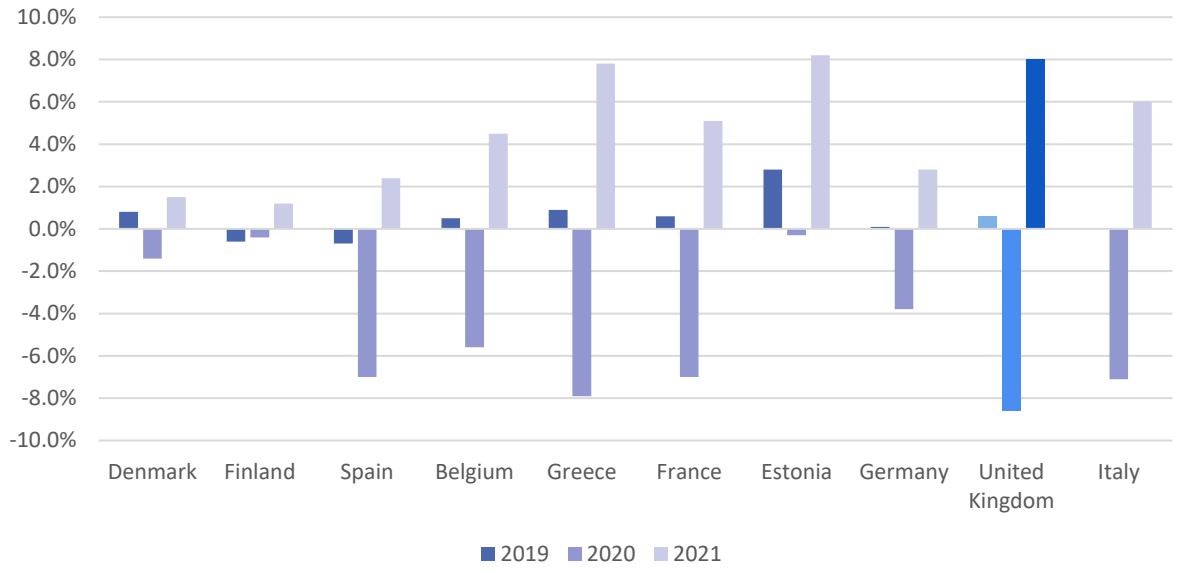
With multiple lockdowns and the broader productivity reducing impacts of COVID-19, the annual productivity growth (GDP per person employed) in the UK was -8.6% in 2020, as presented in Figure 3 on the following page. However, data indicates that, although the UK was the worst hit in terms of productivity growth rates of the countries included for comparison, it was able to recover strongly to 8.0% in 2021. This was second highest of all the countries included.

6 Gross value added (GVA) is a measure of output similar to GDP, but which excludes taxes and subsidies on products. Since these taxes and subsidies are calculated at the UK level, GVA provides a measure of output for activity occurring at a lower level than the UK as a whole, such as regions and industries.

7 House of Commons Library (2022), Economic Indicators

8 OECD (2022), Growth in GDP per capita

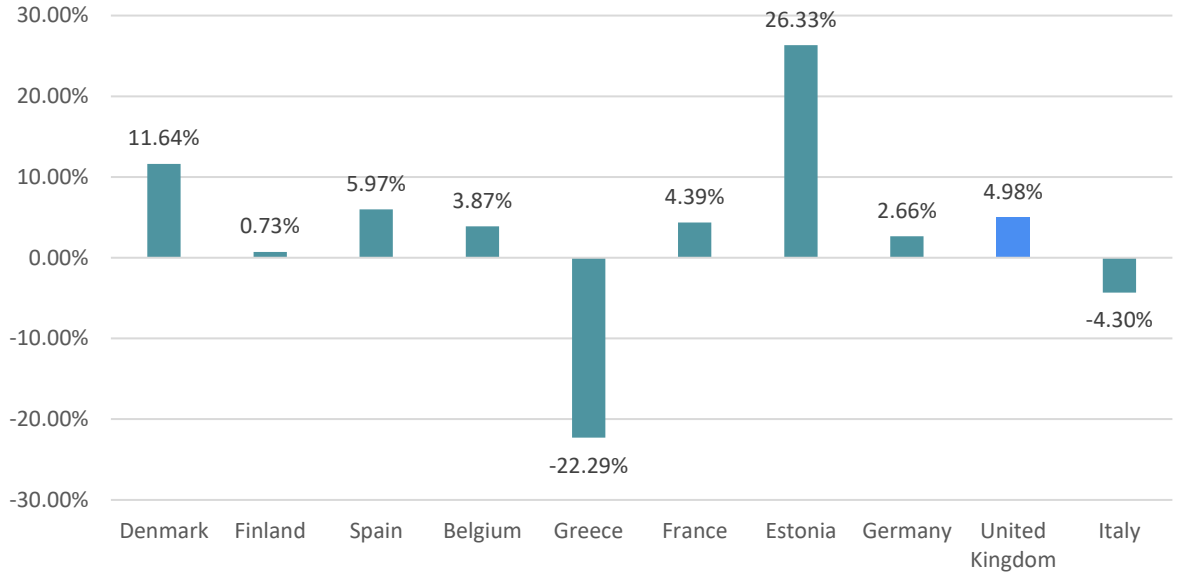
Figure 3: Annual productivity growth (GDP per person employed) between 2019, 2020 and 2021, %



Source: OECD[9]

From a longer-term perspective, despite the two crises of the 2008 financial crash and COVID-19, the UK has achieved a cumulative growth rate of 4.98% (see Figure 4 below) between 2009 and 2021. This is slightly above the median (4.13%) of the countries included as comparators.

Figure 4: Cumulative productivity growth (GDP per person employed) between 2009 and 2021, %



Source: OECD[10]

According to the result of a study by the Centre for Education and Economics, the average wage premium associated with having digital skills is between 3% and 10% of annual

9 OECD (2022), Growth in GDP per capita
10 OECD (2022), Growth in GDP per capita

earnings. In most cases employee earnings are strongly related to their productivity, and therefore employers will generally pay more for people who are more productive, because they stand to benefit from increased output.[11] This indicates that ensuring all UK adults learn Essential Digital Skills would have positive macroeconomic impacts through increased workforce productivity, employability and earnings.

2.2. The impact of technological change and automation on the future of work

One of the key drivers of future economic growth in the UK and across the world is automation. The use of automatic equipment, driven by the development of computer systems, able to replicate certain aspects of human intelligence, has gained rapid momentum in recent years. Although the term 'Artificial Intelligence' (AI) was coined over 50 years ago[12], recent progress in both computer processors and systems has expanded the potential uses of AI into a range of industries and devices. While many contend that the rise of AI is likely to rapidly increase productivity gains, create wealth and make the majority of people better off over the next decade[13], this trend is expected to have significant implications for the economy and in particular the labour market.

Research conducted by PWC on the effect of automation on jobs, suggests that by the mid-2030s up to 30% of UK jobs could be automated.[14] Key examples include driverless cars and trains, which are already threatening to generate significant savings through the process of replacing labour. The exact number of jobs at risk is debated, for example, Arntz, Gregory and Zierahn (2016) find evidence that automation leads to the replacement of only 10% of UK jobs.[15] However, there is consensus that certain jobs, in particular low-skilled roles, and tasks are likely to become less prevalent as the UK becomes increasingly exposed to AI.

Despite the risks posed by the automation of certain types of labour, it is also recognised that AI has the potential to create new jobs and opportunities. According to a 2022 World Economic Forum report[16], 97 million new roles will be created by AI by 2025. For these to be grasped the workforce needs to have the skills and knowledge to take an active part in a more technologically advance environment.

The same PWC study referenced earlier in this section found that 44% of workers with low education are at risk of automation by the mid-2030s. This suggests that the risks for workers' jobs are negatively correlated with skill level, whereby the lower a person's relative skill level, the higher the risk to their job from automation. Within the context of an increasingly digitised UK, digital skills will become increasingly important to employers. As such, achieving a digitally capable workforce is imperative to building a labour market that is robust to the changes that AI present, enabling workers to fill new roles created by the rise of automation.

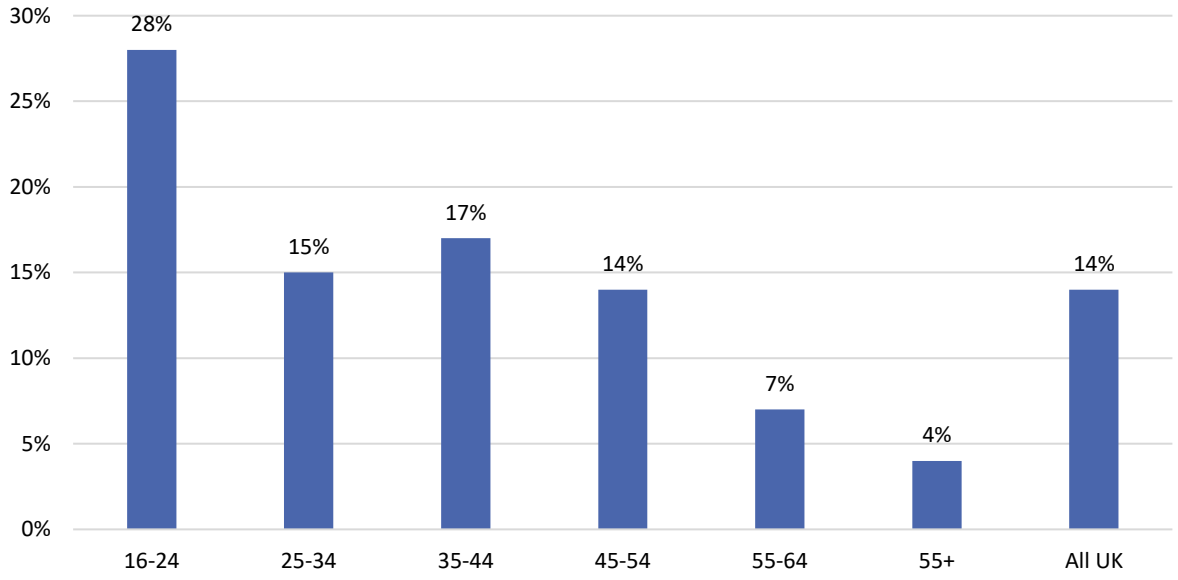
At present, digital skills are not dispersed evenly across the UK population, with certain demographics having a much lower digital skill level than others. There is a risk that those without digital skills will not be capable of adapting to the roles emerging from this fourth industrial revolution, rendering their skill set in low demand. To prevent these groups from

11 Dolton and P. Pelkonen, (2007), 'The Impact of Computer Use, Computer Skills and Computer Use Intensity: Evidence from WERS 2004', Centre for the Economics of Education.
12 Moor, J. (2006), 'The Dartmouth College Artificial Intelligence Conference: The Next Fifty Years.' AI Magazine, Volume 27, No. 4, pp.87-91.
13 Anderson, A., Rainie, L. (2018), 'Artificial Intelligence and the Future of Humans', Pew Research Centre.
14 PWC (2022), 'How will automation impact jobs'
15 Arntz, M., T. Gregory and U. Zierahn (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", OECD Social, Employment and Migration Working Papers, No. 189, OECD Publishing, Paris.
16 World Economic Forum (2022), 'From medicine to drones to coral cleaners: 3 'jobs of the future' that are already here'

becoming marginalised, investment is needed to support the enhancement of their skill set, which will in turn help safeguard their inclusion in an increasingly digitised economy.

Supporting an equitable distribution of skills, and the development of a workforce ready to fill the new, more technologically demanding roles that are likely to emerge, will also be beneficial for the UK. Enhancing skills required by the UK's technological sector is likely to boost innovation and productivity, increase economic growth and advance the UK's position on the world stage.

Figure 5: Proportion of people who use the internet in the last week to look at job opportunities and make online job applications in UK, 2019, %



Source: Ofcom Adult's Media Literacy Tracker[17]

Figure 5 above displays data provided by Ofcom's Media Literacy Tracker, revealing how the proportion of people using the internet to look for job opportunities and applications varies according to age. Although this data is likely to be skewed by the underlying number of job seekers in each age band, it provides an indication of the importance of digital skills and access to the internet play in the process of job search. Notably, only 4% of those over the age of 55 used the internet for job-related purposes within the past week leading up to the survey. This contrasts with the national average of 14%. In comparison, this figure is 28% for those aged 16-24. These results indicate a general downward trend of internet usage for job search as age increases, suggesting that over time technology will play an increasing role in the process of job search, while those without digital skills may miss out on potential opportunities.

2.3. The growing influence of the internet on sales in the UK retail sector

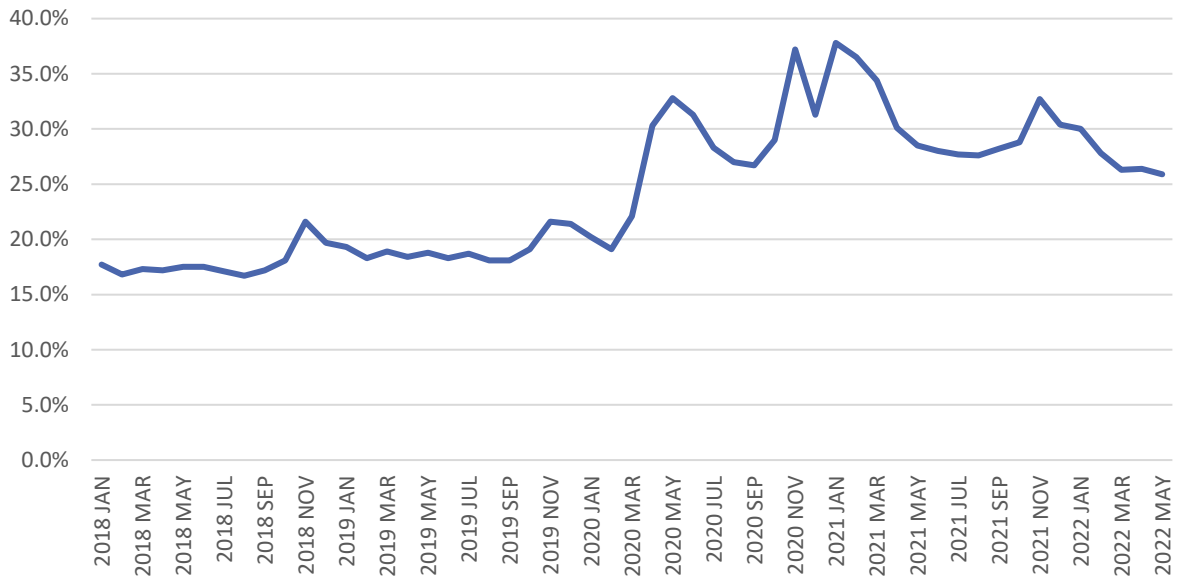
The 3.6 million people referenced at the beginning of chapter 2 of this report, who never use the internet are not able to benefit from the enhancement of their digital skills. Individuals with basic digital skills are more likely to use the internet and in doing so, will benefit from gaining access to an increased range of goods and services, from retailers all over the UK and beyond. This has the potential to yield monetary savings to the consumer, as they compare product

17 Ofcom (2019), Media Literacy Tracker

prices between suppliers, in addition to increased satisfaction from exposure to a wider range of products that are more likely to meet consumers' exact desired specifications. At the same time, barriers to entry into the market are lower for online retailers compared to those operating in physical establishments. The resulting increased volume of online sellers creates competition that can lower consumer prices relative to high street prices.

In May of 2022, internet sales accounted for 25.9% of all retail spending (excluding automotive fuel), representing a substantial increase from the 11.2% presented in the 2018 iteration of this report.[18] The sharp increase in online retail sales shown in Figure 6 below, beginning in March 2020 aligns with the start of the COVID-19 pandemic and associated lock down measures, and resulted in large part from a population prohibited from leaving their homes. This was a key driver of higher amounts of online sales during the pandemic, and online sales as a percent of all retail sales have remained higher than levels seen before the pandemic. Whilst the proportion of retail sales have dropped from a peak of 37.8% in January 2021, it remains much higher than the 16.3% experienced in 2017.

Figure 6: Internet sales as a percentage of total retail sales (ratio), %



Source: ONS[19]

Although there are continued fears surrounding how the internet might impact the UK's retail sector and in particular the UK's highstreets, the rise of online shopping has generated considerable consumer benefits. Thanks to the increasingly important role of electronic intermediaries and 'one-to-one' marketing, prices are made more competitive which gives the consumer more power.[20] Increasing the number of regular internet users in the UK through investing in digital skills would therefore boost benefits to consumers[21] whilst also increasing the presence of the UK's online retail market, perhaps boosting its retail sector overall.

18 Good Things Foundation (2018), 'The economic impact of Digital Inclusion in the UK'

19 ONS (2022) Retail Sales Index Time Series

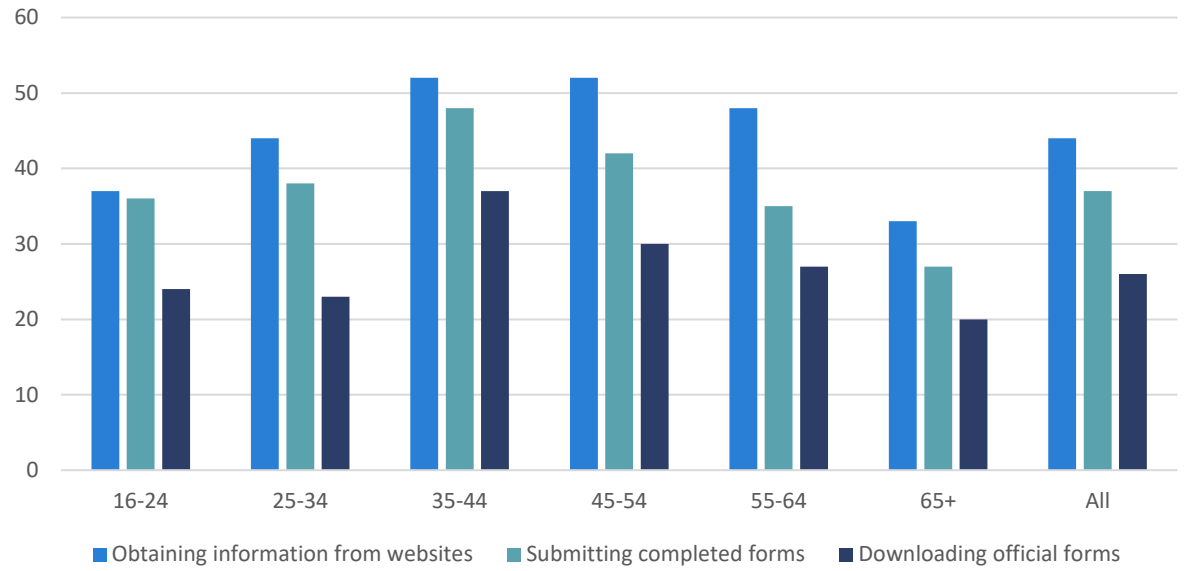
20 Doherty, N.F. and Ellis-Chadwick, F. (2010), "Internet retailing: the past, the present and the future", International Journal of Retail & Distribution Management, Vol. 38 No. 11/12, pp. 943-965.

21 Consumer welfare: In economics, consumer welfare is the difference between what consumers would have been willing to pay for a good and what they actually had to pay.

2.4. Online transactions with government

The UK Government's 2012 Digital Efficiency report estimated that between £1.7 billion and £1.8 billion could be realised as total annual savings to the government and to the users of its services. These savings were stated to come from increased digitisation of transactions driving up efficiency in the provision of services.[22] Figure 7 below displays people's reasons for using the internet as a tool to interact with public authorities or services, by age demographic.

Figure 7: Reasons for using the internet to interact with public authorities or services, by age group, 2020, %



Source: ONS Internet Access – Households and Individuals 2020

Adults in the 35-44 age group had the highest level of interaction with public authorities or services with just under half (48%) submitting official forms, 52% obtaining information from websites, and 37% downloading official forms. In contrast, adults in the over 65 age group and in the 16-24 age group had much lower levels of interaction with UK Government websites. This suggests those over 65 age group either have less need to interact with the UK Government's websites or that they continue to suffer from the digital divide, as they are not fully exploiting the potential to use e-government as much as those in other age groups. Increasing the digital skills of those in the over 65 age group can help to rectify this gap in outcomes and the UK Government continues to recognise the need to address this divergence in outcomes.

In 2022, the UK Government presented its new digital strategy. One of the UK Government's objectives is to ensure that everyone across the country has good internet access. Currently, superfast broadband coverage is at 97%, gigabit-capable broadband at 67% and 4G at 92% coverage. Accessibility is an important complement to digital skills to enable everyone to have the ability and opportunity to access UK Government services online. Cyber resilience and general confidence to engage in online activity is also an important element of ensuring high levels of digital inclusion. The UK Government has invested £114m million to support the National Cyber Programme and has supported over 120 councils at the local level to support digital security. In conjunction with efforts in the private and third sector, this will support the

22 GOV UK (2012), Digital Efficiency Report

continued increase in the proportion of online activities that make up the interactions people have with the UK Government.

3. Investments required for digital inclusion

In this section we investigate the number of UK adults who are currently without basic digital skills, those that are likely to gain skills organically from 2021 through 2023, those who will require support to gain basic digital skills, and the costs of providing this support. The methodology used is similar to that used in the 2018 iteration of this report.

3.1. Those who require digital skills support

For most people in the UK, accessing the internet and usage of digital skills is part of daily life. Digital skills are used at work, to socialise, to access healthcare, buy groceries, to bank and to make every day, time-consuming tasks more efficient. However, an adverse consequence of having a highly digitised society is that those without the skills and knowledge necessary to effectively use digital tools face social exclusion in many areas of UK society.

The digital landscape in the UK has changed drastically over the last 20 years, with tangible changes even occurring since the 2018 iteration of this report, owing to the of the effects of the COVID-19 pandemic. According to Ofcom's 2018 Communications and Market Report[23], 87% of households had internet access in 2018. While according to the regulator's most recent report[24] UK residents became more dependent than ever on online services over the numerous lockdowns, and by the end of 2020 approximately 94% of UK homes had internet access up from 89% in 2019. Online services acted as a central means through which people accessed information about the pandemic, the health services available to them and even as a crucial method of accessing GP appointments. Although the pandemic caused many more people to get online, the consequences for those who remained excluded are expected to have increased in severity.

This part of the report details how we have estimated the number of people who are without digital skills and the resulting number who will require support to acquire digital skills each year from 2023 through 2032. We have followed the same methodology as in our 2018 report, with two exceptions:

1) The multiplier used to describe the relationship between those without basic digital skills and those who do not use the internet regularly has been calculated using an average of two years of data instead of one, in addition data for the most recent pre-covid years (2018 and 2019) were taken instead of the most recently available data. Taking two years of data as opposed to one increases the robustness of the estimate.

2) Because 2020 was an abnormal year and distorted the relationships between many variables away from long-term trends, some assumptions have been based on 2019 (pre-COVID) data instead of using the most recent year for which data exists. For the same reason, the methodology used to estimate the number of people without basic digital skills in 2019, 2020 and 2021 is different in this refresh of the report. We have directly applied Lloyds Banking Group estimates for the proportion of each age group without the essential digital skills for life to our population estimates in these respective years, to estimate the number of people without basic digital skills in 2019, 2020 and 2021. In the 2018 iteration of this report, we used ONS data on those who do not use the internet regularly as a proxy for those without digital skills and used the above-mentioned multiplier to translate these figures into estimates for the number of people without basic digital skills in these years. While our methodology has remained very similar, our models have been updated with the most recent data.

23 Ofcom (2018), Communications and Market Report 2018 pp.11
24 Ofcom (2021), Online Nation 2021 pp.3

The first part of this analysis involved computing the number of people without basic levels of digital skills in the UK, and how many would require support to gain these digital skills over the 10-year appraisal period from 2023 through 2032. We used the following data sources to calculate these projections:

- ONS internet users 2020 statistics – this dataset was published in 2021 with the latest year of data it provides being for 2020. This dataset shows the proportion of each age demographic who regularly, irregularly, and never use the internet for both those recognised by the 2010 equality act as disabled and those who are not. The historical regularity with which this dataset is published allows us to see the rate of change of these variables over time and is therefore a preferable indicator of longer-term trends than the Lloyds CDI data (detailed below). This data was used as a partial proxy for the acquisition of digital skills.

- Lloyds Banking Group Consumer Digital Index (CDI) 2019, 2020 and 2021 data [25]. This data provides an estimation of the percentage of people who can complete all, some or no digital tasks at the foundational level, for work and for life. These percentages are further broken down by age band, region, working status and other descriptive factors. We used data on the percentage of each age band that did not have the Essential Digital Skills (EDS) needed for life, according to the Lloyds Banking Group framework. We have used this measure because it is the most comparable to the measure of Basic Digital Skills used in the 2018 report. This data was used to calculate a multiplier which describes the relationship between internet usage and digital skills. Although more recent data (for 2020 and 2021) was available at the time of analysis we chose to use 2019 data as indicative of long-term trends as this was the most recent non-covid year. This data was also applied directly to our population estimates for 2019, 2020 and 2021 to estimate the number of people in these years without basic digital skills.

- The Lloyds Banking Group/Ipsos Mori UK Consumer Digital Index Report 2018 survey utilised in the 2018 iteration of this report was also utilised to establish the relationship between internet usage and digital skills. Our aim was to calculate a long-term multiplier which estimates the relationship between internet usage and digital skills and can effectively translate the proportion of people in each age band who do not regularly use the internet, to the proportion of people in each age band who do not have basic digital skills. We used an average of the two most recent pre-covid years (2018 and 2019) to give us the most accurate results because, firstly, we wanted to ensure the data was relatively recent and, secondly, the use of an average of two years of data is more robust than using one year.[26]

The steps we took to estimate those who require digital skills training in the UK were as follows:

- **Step 1 – Calculating the number of people without basic digital skills from 2019 through 2021.** Lloyds Banking Group produces data on the proportion of people who have all, some, or none of the digital skills for work, life and what they describe as foundational skills which comprise seven essential tasks from 2019 through 2021. This data is provided with breakdowns by age demographics, region, gender, income, and

25 Lloyds Banking Group (2019-2021), Essential Digital Skills Tables

26 While calculating the multiplier, we found that using the Lloyds 2018 and 2019 CDI data separately gave us very similar results, while using 2020 and 2021 data output very different results. This provided evidence for our assumption that data gathered over the pandemic years has been distorted by abnormal circumstances and should not be used to establish long term trends.

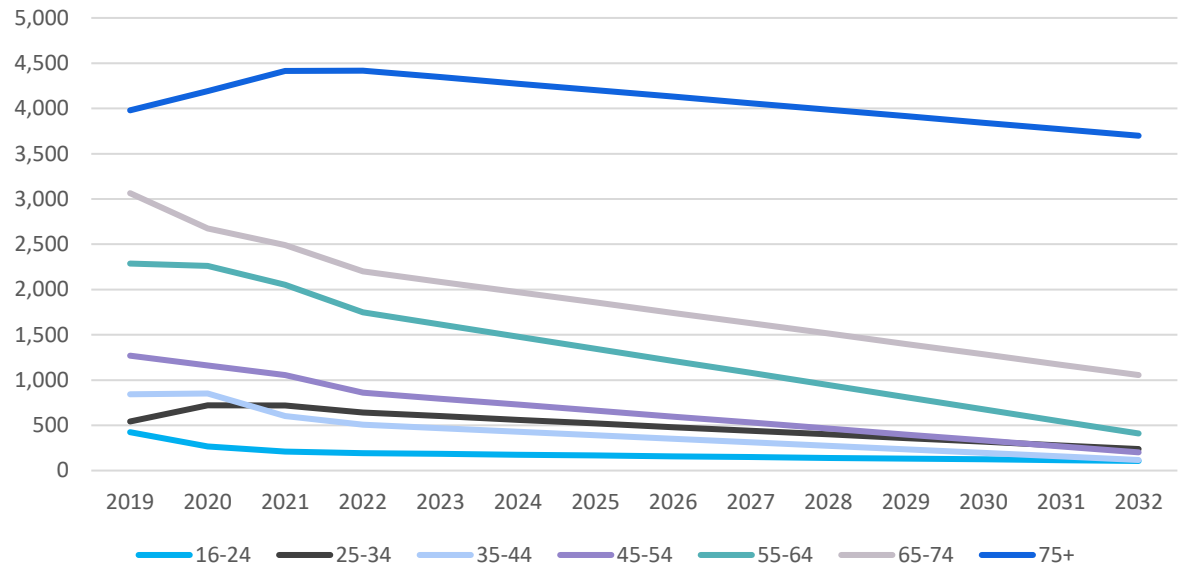
other descriptive factors. We applied the percentage of people who do not have the essential digital skills for life, according to the Lloyds Banking Group framework, by age bands in 2019, 2020 and 2021 to ONS population estimates for these age bands in these years respectively, to obtain estimates for the number of people in the UK without basic digital skills in these years.

- **Step 2 – Estimating the proportion of each age group who does not use the internet regularly from 2021 through 2032.** Using the ONS internet users' data, we calculated the proportion of each age group who used the internet irregularly or not at all, each year from 2015 through 2020. We used data within this five-year window as going back further historically into the data may not represent trends occurring presently. We then calculated the year-on-year change in these percentages, and then the year-on-year changes in these second order values respectively. This is known as an autoregressive function as we are predicting future values based on past historical data observations. Excluding the year-on-year changes which occurred in 2020, we took an average of these second order autoregressive factors over the years 2015 through 2019, achieving a result of 0.96. This means that, on average from data on internet usage from 2015 to 2019, the rate of change in the proportion of people in each age bracket who do not use the internet regularly each year is 0.96 of that of the previous year. For example, if the proportion of 16 – 24 year-olds who do not regularly use the internet falls by 8.6% from 2021 to 2022, we estimate that the decline from 2022 to 2023 will be 96% of the 8.6% decline in the previous year; our model projects that the proportion of 16 – 24 year-olds who do not regularly use the internet will fall by 8.3% from 2022 to 2023. Applying this decay parameter to the proportion of people in each age band who do not regularly use the internet, calculated from ONS data, we are able to estimate the proportion of people in each age band who do not regularly use the internet in each year from 2021 through 2032.

- **Step 3 – Calculating and applying the multipliers.** The next step involves calculating the multipliers (one for each age band) which describe the relationship between those who do not use the internet regularly and those without basic digital skills. We take the percentages of each age band that do not have life EDS according to Lloyds CDI data in 2019 and divide by the percentage of people in the same age bracket who do not use the internet regularly according to ONS data. We repeat this process using the Lloyds/Ipsos Mori 2018 CDI data. We then take the average of these two outputs, for each age band respectively, as our multipliers which enables us to use ONS data on irregular internet usage as a proxy for those without digital skills. Our projections for the percentage of each age band who do not use the internet regularly (detailed in step two) are then multiplied by our digital skills multipliers for each age band, to achieve estimates for the percentage of each age band who are without basic digital skills from 2022 through 2032.

- **Step 4 – Drawing the output together.** The percentages of each age band without digital skills, calculated in step three are applied to our population estimates for each age band from 2022 through 2032, returning estimates for the number of people without basic digitals skills through these years. They are then compiled with our estimates for the number of people without basic digital skills in 2019 through 2021, calculated in step 1. By collating these figures, we obtain estimates for the number of people in the UK who do not have basic digital skills from 2019 through 2032, presented in Figure 8 below.

Figure 8: Number of people without basic digital skills, without intervention, 2019 – 2032, thousands



Source: Ipsos Mori, Lloyds Banking Group digital index, ONS, Cebr analysis

Figure 8 shows Cebr's projections for the number of people without basic digital skills from 2019 to 2032, without an intervention of digital skills training. The data and our above-described methodology show that the number of people without basic digital skills in the UK is expected to decline organically, without an additional assistance provided to individuals. This trend is seen across all age bands, albeit at different rates, with younger demographics more likely to gain skills independently than older demographics.

We find that for all age groups, the total number of UK adults without basic digital skills fell by approximately 277 thousand from 2019 to 2020. However, the COVID-19 pandemic is expected to have had different effects on the digital skill level of those in different age categories, widening the gap between those least likely (75+) and most likely (16 – 24) to have life EDS. The percentage of people in the youngest age category without EDS for life declined from 6% to 4% from 2019 to 2020, as lockdown measures forced many in this age group to focus on digitally upskilling, in order prevent economic and social exclusion. This trend was only seen in certain demographics however, for example, according to the data from Lloyds Banking Group[27] the number of 65 – 74 year-olds who could not perform all essential tasks required to have life EDS fell by 13% from 2019 to 2020, whereas those aged 16 – 24 without EDS for life declined by 37%. For those 75 and older, the number without life EDS grew by 5% from 2019 to 2020, and by 11% from 2019 to 2021. This is particularly troubling as this demographic is the most vulnerable to suffering severe medical consequences of catching the COVID-19 virus and therefore having the digital skills to access the most up to date information and healthcare available to them would have been an important factor, helping to safeguard their health and well-being during the pandemic.

Surprisingly, despite being young, the COVID-19 pandemic is expected to have had an adverse effect on the digital skills of 25 – 34 year-olds, with data from the Lloyds Banking Group Essential Digital Skills tables indicating that the percentage of this group with EDS for life fell from 94% in 2020 to 92% in 2020, remaining at 92% in 2021. In addition, ONS internet usage data shows that from 2019 to 2020, the decline in the proportion of people in each age

27 Lloyds Banking Group (2019-2021), Essential Digital Skills Data Tables

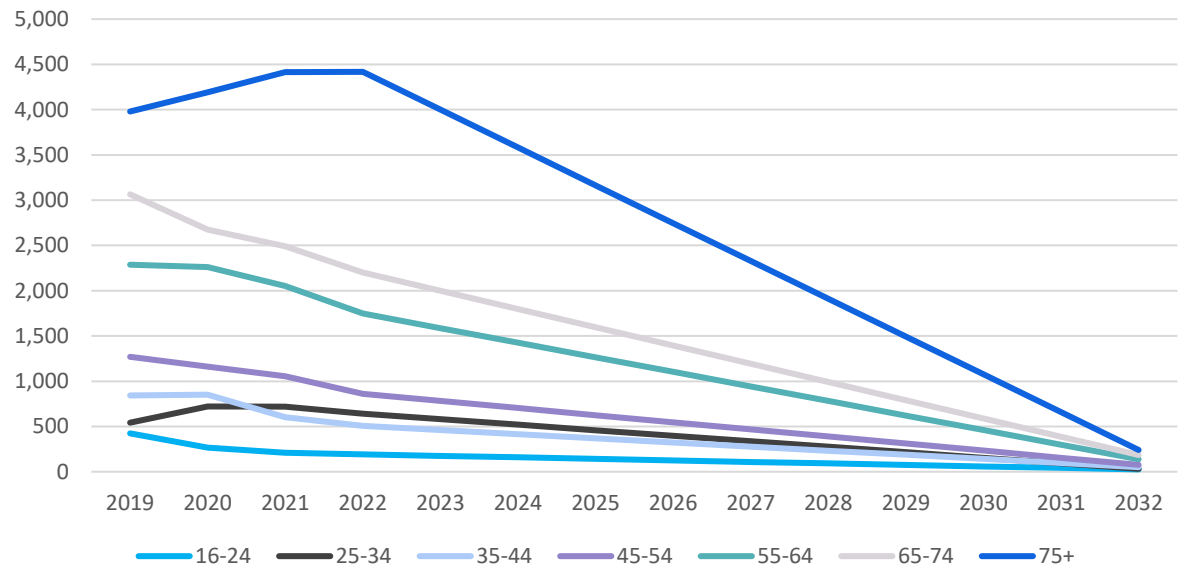
category who do not regularly use the internet fell more slowly for 25 – 34 year olds (by 11%) than for those immediately younger (16 – 24 year-olds) and older (35 – 44 year-olds), who saw year on year percentage declines of 23% and 24% respectively.

With the demographic breakdown included in Figure 8, we can see that those aged 75+ are most likely to be digitally excluded and the rate at which these demographic gains digital skills organically is slower than for other demographics. Using the methodology described in this section, **Cebr estimates that approximately 11.5 million people were without basic digital skills by the end of 2021,** falling to 10.6 million in 2022. Our modelling of ONS and Lloyds data detailed earlier in this section shows that approximately 474,000 people per annum will gain basic digital skills organically over the appraisal period from 2023 through 2032 organically, without the provision of digital skills training, leaving **5.8 million people in the UK without the essential digital skills for life by the end of 2032.**

In this iteration of the report, we make a conservative assumption that 750 thousand people will never attain basic digital skills, even with efforts to create a digitally included society with the provision of digital skills training.[28] This may be for a variety of reasons, including but not limited to the fact that some people do not want to gain digital skills. The percentages of those without basic digital skills in each age band were used to estimate how the remaining 750 thousand is likely to be split by age demographic by the end of 2032.

Figure 9 below shows the rate of decline in the number of people without basic digital skills required to reach full digital inclusion by the end of 2032, incorporating the 750 thousand who will remain digitally excluded by the end of the period (owing to never having gained the basic digital skills to use the internet - including some by choice - or owing to being 'lapsed' internet users - whether by choice or reflecting other life changes such as disability and health conditions.

Figure 9: Number of people without basic digital skills, with training intervention, 2019 – 2032, thousands

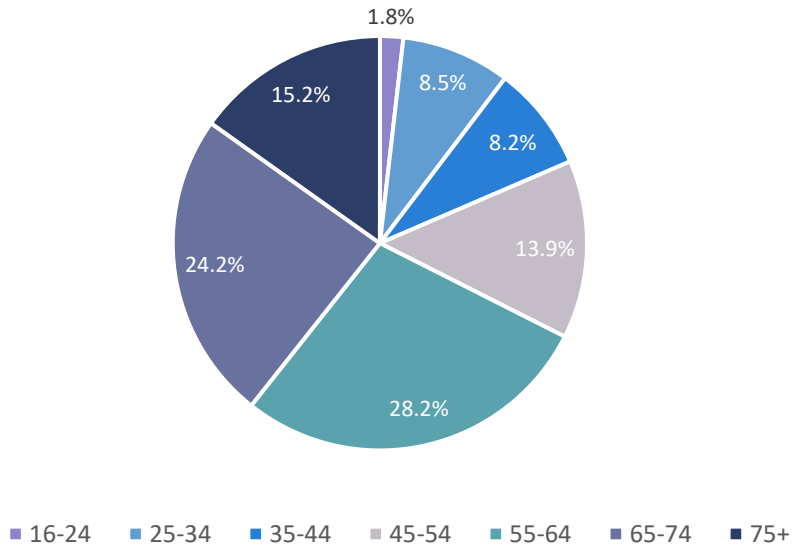


Source: Ipsos Mori, Lloyds Banking Group digital index, ONS, Cebr analysis

28 This estimate was provided by Good Things Foundation - A declining minority of people who are offline say nothing would make them go online (Ofcom 2022, Lloyds Banking Group 2021). Evidence also shows 'lapsed' internet use, whereby people stop using the internet, often related to changes in later life (Age UK 2021 / English Longitudinal Survey on Ageing) We also apply historic knowledge on the uptake of landline telephone ownership. Whilst seemingly a ubiquitous technology in the in the 1990s, ownership only ever reached a maximum of 95% in 1998-2000 before losing customers since with the rise of mobile and broadband technology

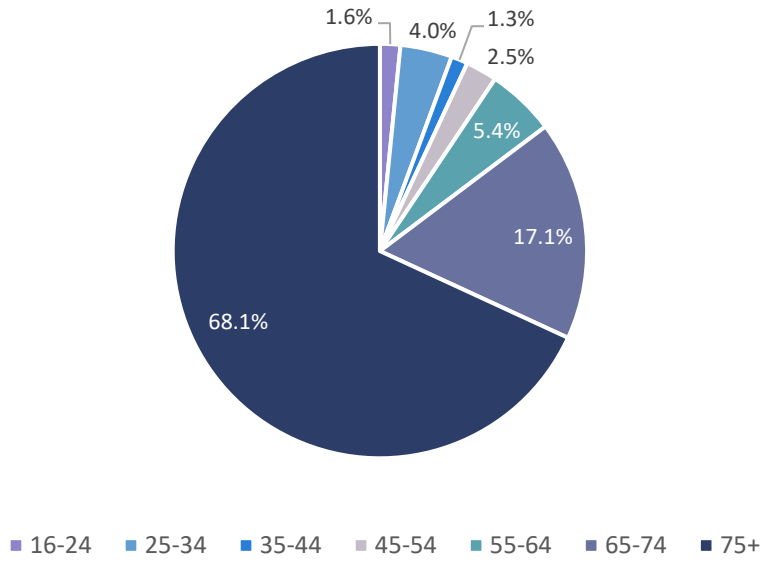
To achieve a digitally included society by the end of 2032 such that only 750 thousand people remain without basic digital skills by the end of the period, 981 thousand people must become digitally included each year from 2023 through 2032 inclusive. As previously mentioned, using the above-described methodology, it is estimated that approximately 474 thousand people per annum will gain basic digital skills organically. Consequently, approximately 508 thousand people will require training in each year of the appraisal period (2023 through 2032), in aggregate, 5.1 million people over the entire period. Figures 10 and 11 below display the demographic percentage breakdowns of those who are likely to gain digital skills organically, and those who require digital skills support from 2023 to 2032 respectively.

Figure 10: Demographic breakdown of those gaining skills organically, 2023 – 2032



Source: Ipsos Mori, Lloyds Banking Group digital index, ONS, Cebr analysis

Figure 11: Demographic breakdown of those who require support, 2023 - 2032



Source: Ipsos Mori, Lloyds Banking Group digital index, ONS, Cebr analysis

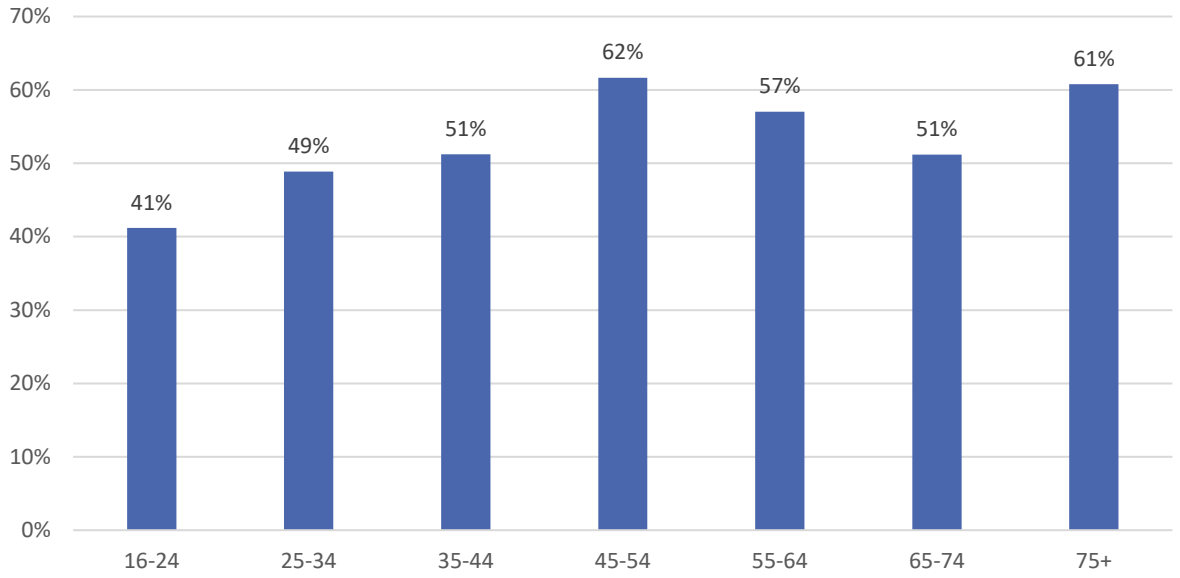
Although approximately 4.8 million are expected to gain digital skills organically over the 10-year period, this group is expected to skew younger. For the UK to achieve digital inclusivity by 2032, 608 thousand 25 – 34 year-olds must gain the essential digital skills for life. Our modelling shows that 66% of them are likely to gain these skills organically, while the remaining 34% will require additional support. By comparison, of the 4.2 million people aged 75 and over who must gain life EDS, only 17% of them are expected to do so organically, 83% (3.5 million) are likely to require additional assistance. These demographic differences indicate that without an intervention of digital skills support, a large portion of the UK's older demographics will remain digitally excluded.

Since the 2018 iteration of this report, much has changed in the UKs economic landscape. The COVID-19 pandemic has had a significant impact on the rate of digitisation in the UK, while data[29] indicates that the stay-at-home lockdown measures impacted different demographics in different ways. As previously mentioned, the majority of those in younger demographics were not as adversely affected by the pandemic as their older counterparts. This is likely because using digital skills over the period was a necessity for them to stay in contact with friends and family, for entertainment and career development. Conversely, those in older demographics gained digital skills at a much slower pace over this period, while the digital skills of those aged 75 and over appear to have declined. Overall, the number of 16 – 44 year olds in the UK without basic digital skills declined by 15% from 2019 to 202, while this figure was 6% for those aged 45 and over. Consequently, the demographic make-up of those who require digital skills support is skewed towards older demographics in this iteration of the report in comparison to previous years. This has knock on effects on the monetary benefits accrued through each benefits stream.

As in the previous report, we also provide a breakdown of those who require digital skills training by disability, specifically those who are recognised as disabled by the Equality Act 2010, and those who are not. The Equality Act 2010 defines a disabled person as someone who has a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on their ability to do normal daily activities. Using ONS data on internet users 2020 by disability, we estimate the proportion of those who require digital skills support in each age band who are disabled as defined by the Equality Act 2010, presented in Figure 12 on the following page.

29 Lloyds Banking Group (2021), Essential Digital Skills Tables.

Figure 12: Percentage of those who require digital skills training and are disabled, by age group



Source: ONS, Cebr analysis

Learners are categorised in this way, firstly because data suggests that disabled and non-disabled people have different employment career paths and earnings outcomes, which affects several streams of our analyses; and secondly to acknowledge that those who are recognised as Equality Act disabled are overrepresented in the group of people who are digitally excluded.

Analyses conducted in several benefits streams included within this project (corporations, employment, earnings, government revenue, environment) require a breakdown of learners by economic status. There were a number of steps involved in estimating the economic status (employed, unemployed or inactive) of those who require digital skills support. We first estimated the disability status of the 508 thousand who require digital skills support using ONS internet users data.[30] Our findings are presented in Figure 12 above. We took this step, as data shows that average employment outcomes vary between those who are disabled and non-disabled. The ONS collects data on the employment circumstances of the UK population, and using official measures of employment and unemployment, publishes this day within the Labour Force Survey (LFS).[31] Within the LFS, data is presented on the economic activity status of Adults in the UK, disaggregated by those who are classified as disabled under the Equality Act 2010, and those who are not. We utilised the most recent non-Covid year of data for which this dataset was available (2018/19), to estimate the economic status of those who require digital skills assistance, by disability level respectively. The age bands used in the LFS data were different from those which we have used throughout this report to provide a demographic breakdown of those who do not have basic digital skills and those who require support. Consequently, some rescaling was done to accurately apply the LFS data to our analysis. We combined this data with results of the Lloyds Banking Group EDS survey used to estimate the economic status of learners in the previous iteration of this report so as to make the two studies comparable, while also updating for more recently available data. Our

30 ONS (2020), Internet Users, UK 2020

31 ONS (2021), Labour Force Survey

results for the proportion of each age demographic, by disability status, that are in each category of employment status are very similar to that of the 2018 version of this report, with all differences being smaller than 1%. Applying these proportions to the 508 thousand who require digital skills assistance, we estimate that **approximately 33.2 thousand are employed, 4.3 thousand are unemployed while 470.8 thousand are economically inactive.**

Table 1: Breakdown of learners by disability status, age group and economic status, 2023 – 2032, %

	Disabled			Non-disabled		
	Employed as % of total	Unemployed as % of total	Inactive as % of total	Employed as % of total	Unemployed as % of total	Inactive as % of total
16-24	7.8%	5.6%	27.8%	16.0%	5.0%	37.9%
25-34	13.6%	4.0%	31.2%	21.3%	1.9%	27.9%
35-44	14.6%	2.9%	33.8%	20.9%	1.2%	26.7%
45-54	16.7%	3.3%	41.6%	16.7%	0.9%	20.8%
55-64	11.1%	2.5%	43.4%	15.5%	1.0%	26.5%
65-74	2.0%	0.2%	49.0%	4.7%	0.2%	44.0%
75+	0.4%	0.0%	60.4%	0.9%	0.1%	38.3%

Source: LFS, Ipsos Mori, Cebr analysis

3.2. Calculating costs

Quantifying the investments required to ensure that the number of adults without basic digital skills falls to 750 thousand by 2032 involves establishing costs associated with providing support and assistance to those who need it.

In this 2022 iteration of the report, the methodology used in costing is consistent with that of the 2018 iteration. In line with previous reports, we find that the costs of supporting an individual's acquisition of essential digital skills for life varies greatly, depending on the skill level of the learner. There are three types of costs incurred: operational, capital and user costs. We relied on data from Good Things Foundation to build the operational and capital costs associated with establishing and maintaining a 'basic skills' learning centre. The data used was acquired from seven Digital Inclusion Hubs operating in the UK.

Capital and operational costs of supporting digital inclusion

There have been no structural changes affecting the costs of supporting digital inclusion since the release of the 2018 iteration of this report. Consequently, changes to costs involved are inflationary. As with the previous analysis, the variation in costs between the different Digital Inclusion Hubs is driven by the type of learner that attends each hub. The type of support needed can vary greatly between learners of different skill levels; some may require one to one support whereas others need only a small amount of tuition and supervision. Those Digital Inclusion Hubs whose learners require a greater level of support, and therefore have higher staff to learner ratios, have higher operating costs as a result.

The physical location of a Digital Inclusion Hubs also influences its' operational costs. Hubs that are located near to other community operators which provide facilities useful to those learning digital skills such as libraries are likely to share provision of services that learners need with these other facilities, lowering their costs. For the purposes of this report, the operational costs related to providing digital skills support that we have identified are property rental, utilities, telephone/internet, insurance, printing costs, volunteer costs and staff salaries.

Capital costs also varied across the different client hubs. Location is also likely to be a determining factor of capital costs, as market prices vary across different parts of the UK. Capital costs included in this analysis include flooring, furniture, stationary, IT equipment and signage. In line with the previous iterations of this report, the annualised value of capital investments were calculated using a straight-line depreciation formula. As with the 2018 iteration, we find that capital costs represent between 1% and 10% of the overall costs of tuition.

Applying the different data points to the specific attributes of learners in this iteration, and adjusting for inflation we find that, in 2022 prices, **the overall cost per learner ranges from £49 to £434.**

Variation in the cost of supporting digital inclusion

To accurately assess the costs associated with supporting the estimated 508 thousand who require digital skills assistance each year, we factored in the different support levels that learners were likely to need. In line with previous iterations of this report we find that there are three main drivers of variation in support level required.

- **Disability status** – Those with both physical and mental disabilities are likely to benefit from a greater level of support when learning digital skills. To differentiate learners by disability status, we have used the Equality Act 2010 which defines a disabled person as having a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on their ability to do daily activities.[32]

- **The level of existing knowledge** – Those who already have foundational digital skills, acquired through either formal training or organic means, are likely to require a lower level of support and assistance to acquire the essential digital skills for life. As was done in the previous refresh, we estimate the current skill level of those who require digital skills support.

- **Age** – Lloyds Banking Group data[33] indicates that within older demographics, there exists a higher proportion of people who do not have essential digital skills than in younger demographics. Consequently, on average it is likely that someone in an older demographic will require more assistance to attain digital skills for life.

These attributes were incorporated into our cost model, enabling us to tailor both capital and operational costs to the level of support learners in each demographic are likely to require on average. The variation in cost per person differentiated by the attributes of the learner not only ensures our estimates are more accurate, but also makes them higher than if we were to use

32 Equality Act (2010) Definition of disability

33 Lloyds Banking Group (2021) Lloyds Essential Digital Skills Report 2021

a flat rate. Table 2 below shows the average operating and capital cost per learner, varied by age demographic and disability level.

Table 2: Average operating and capital cost per learner, by age group and disability status, £

	Disabled		Non-disabled	
	Operating cost per learner	Capital cost per learner	Operating cost per learner	Capital cost per learner
16-24	£176.15	£5.79	£47.04	£1.55
25-34	£212.46	£6.99	£56.73	£1.87
35-44	£219.41	£7.22	£58.59	£1.93
45-54	£279.26	£9.18	£74.57	£2.45
55-64	£299.78	£9.86	£80.05	£2.63
65-74	£339.33	£11.16	£90.61	£2.98
75+	£420.66	£13.83	£112.33	£3.69
Average	£278.15	£9.15	£74.27	£2.44

Source: Lloyds Banking Group/Ipsos MORI, ONS, Cebr analysis

The costs presented in Table 2 are applied to those gaining skills annually, by age and disability level. We find that capital and operating costs amount to £4.4 million and £135.2 million annually, respectively. **Consequently, total investment costs sum to £139.6 million per annum.** In comparison, the 2018 iteration of this report found that investment costs would sum to £146 million. The reason for this decline is twofold. Firstly, in this 2022 refresh, we estimate that 508 thousand require digital skills training annually whereas in the 2018 refresh this figure was 694 thousand per annum, with the decline in the number of people who require support pushing down annual investment costs. However, the age demographics of those who require digital skills support in this iteration of the report is proportionally older than those who required support in the 2018 refresh, pushing the average per person costs over all ages and disability levels upwards. The combined effects of these opposing forces have resulted in annual investment costs being lower than the 2018 refresh, but less than proportionately to the decline in the number of people who require digital skills support.

User Costs

In addition to the investment costs required by learning centres, costs are also incurred to learners. This is because individuals who have acquired digital skills will need digital devices to fully utilise them. Technological advancements have greatly increased the capabilities and applications of smartphones in recent years. As such, the majority of digital tasks needed for daily life such as online banking and shopping can now be done on a smartphone device. As the cheapest category of digital devices on which most tasks related to the essential digital skills for life can be completed, we estimate that the minimum cost that each learner will take on to access the internet and complete other digital tasks, is the price of a smartphone. [In taking this approach for the purpose of this analysis, it is important to add that smartphone only use will not be optimal or sufficient for some people - thinking about what people use their device for, usability and accessibility, and critical understanding.]

Using data from Lloyds Banking Group/Ipsos Mori and ONS[34], we were able to estimate the percentage of people who do not have smartphones currently, by age demographic, and forecast the decline in these percentages each year from 2023 to 2032. This was applied to the 508 thousand who require digital skills support annually over the appraisal period.

The average cost of purchasing a smartphone was calculated using data from Gfk[35] in 2018 and inflated for 2018 prices. We estimate that the cost of purchasing personal devices in 2023 is £49.2 million, decreasing to £17 million in 2032. The changes in per person costs of smartphones since the 2018 refresh are purely inflationary. However, we estimate that more people now own smartphone devices than four years ago, and therefore a lower proportion of those who require digital skills assistance will need to purchase a smartphone.

Table 3: Total costs, 2023 – 2032, £m

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Cost of devices	49.2	45.5	42.1	38.6	34.7	30.8	27.0	23.4	20.0	17.0
Capital costs	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
Operating costs	135.2	135.2	135.2	135.2	135.2	135.2	135.2	135.2	135.2	135.2
Total costs	188.8	185.1	181.8	178.2	174.4	170.4	166.6	163.0	159.6	156.6

Source: Lloyds Banking Group/Ipsos MORI, ONS, Gfk, Cebr analysis

Table 3 above shows the operating, capital device and total costs required to train 508 learners annually, for each year of the appraisal period. These range from £188.8 million in 2023 to £156.6 million in 2032.

In line with UK Government guidelines, to put these costs in 2022 values, we use a discount rate of 3.5%. In 2022 values, we present our estimates for the costs of achieving a digitally inclusive UK by 2032 in Table 4 below.

Table 4: Discounted costs, 2022 values, £m

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total costs	182.4	172.8	163.9	155.3	146.8	138.6	130.9	123.8	117.1	111.0

Source: Lloyds Banking Group/Ipsos MORI, ONS, Gfk, Cebr analysis

Combining capital, operational and user costs, we find that total costs range from £182.4 million in 2023, gradually declining each year to £111 million in 2022. **Over the ten-year appraisal period, these costs sum to £1,443 million.**

34 ONS (2020) Internet Access – Households and Individuals

35 GfK (2018) Average price of a smartphone

4. Benefits

This section assesses the monetary benefits that digital inclusivity is likely to add to the UK economy. All values have been calculated into 2022 prices.

4.2. National Health Service (NHS)

In this section we estimate the likely savings to the NHS accrued as a direct result of achieving digital inclusivity in the UK. Our estimate is a conservative one, as we focus on the impact that achieving a basic level of digital skills has on reducing demand for avoidable GP consultations.

Digital platforms are being increasingly recognised as an effective tool for improving efficiency and reducing costs within the UK's National Health Service (NHS). In July 2019, the department for Health and Social Care and NHS England alongside NHS Improvement established a new unit, NHSX, responsible for driving digital transformation within the NHS.[36] Within the same year, the NHS 'Long Term Plan' was published, detailing improvement aims over a 10-year period.[37] Included in this plan are numerous goals related to digitising the NHS, for example providing every patient with the option of digital GP consultations. In addition, the report dedicates a chapter to making digitally enabled care mainstream across the NHS, with listed benefits including millions in savings, relieving pressures on NHS delivery, increased convenience for patients and improved quality of care and health outcomes. However, realising these potential benefits requires a digitally included population, capable of utilising digital services available.

The methodology used to quantify these monetary savings to the NHS is similar to that used in the most recent (2018) iteration of this report. Data utilised from the NHS Widening Digital Participation (WDP) programme has been updated since the analysis of the 2018 Digital Inclusion report was conducted. The 2018 iteration took data from a 2016 report summarising the findings of the NHS WDP programme implemented in the three consecutive years starting in July 2013.[38] This report found that 21% of learners made fewer calls and visits to their GP, with 40% of those who reduced GP consultations saving at least three visits. In contrast, the WDP data used in the analysis for this report has been obtained from the more recently conducted NHS WDP programme running from 2017 through 2020, which found that 33% of learners reduced the number of GP appointments by an average of 4.8 appointments each.[39]

To increase the robustness of our methodology compared to the previous refresh, we break down learners by demographic and estimate the likely reduction in GP consultations as a direct result of gaining basic digital skills for each demographic separately. This represents an improvement on the methodology used in the 2018 iteration of this report and has the effect of ensuring our estimates for the monetary benefits to the NHS consider the specific features of those who require digital skills assistance.

To compute this demographic breakdown, we utilised several key pieces of research:

- Hobbs et al (2016) conducted a retrospective analysis of GP and nurse consultations between 2007 and 2014, with the aim of assessing the direct clinical workload of general practitioners (GPs) and practice nurses in primary care in the UK. In doing so, they collated a large dataset from a variety of sources, on primary care health

36 National Audit Office (2020). Digital Transformation in the NHS

37 National Health Service (2019). The NHS Long Term Plan

38 Good Things Foundation (2016) Health & Digital: Reducing Inequalities, Improving Society. An evaluation of the Widening Digital Participation programme.

39 Good Things Foundation (2020) Digital Inclusion in Health Care

consultations in the UK. They were able to provide a breakdown by demographic of the annual number of GP consultations attended per person from 2007/08 to 2013/14, for a sample size of 20.6 million patients.[40]

- Kontopantelis et al (2021) aggregated general practice data from the Clinical Practice Research Datalink (CPRD) GOLD database to financial years, to investigate the distribution of consultations at the practice level.[41] We used data published in this study to scale GP consultations by demographic from Hobbes et al (2016) to the most recent non-covid pandemic financial year (2018/19).

- The ONS produces annual estimates of regular, irregular, and non-internet usage by age demographic, sex, disability and geographical location. We utilised the most recently available version of this dataset at the time of analysis, covering years 2015 – 2020 inclusive, published in 2021.[42] In line with the methodology described earlier in this report, we excluded 2020 data from our calculations as long-term trends were distorted in this year, and as such are unreliable to use within projections of future trends.

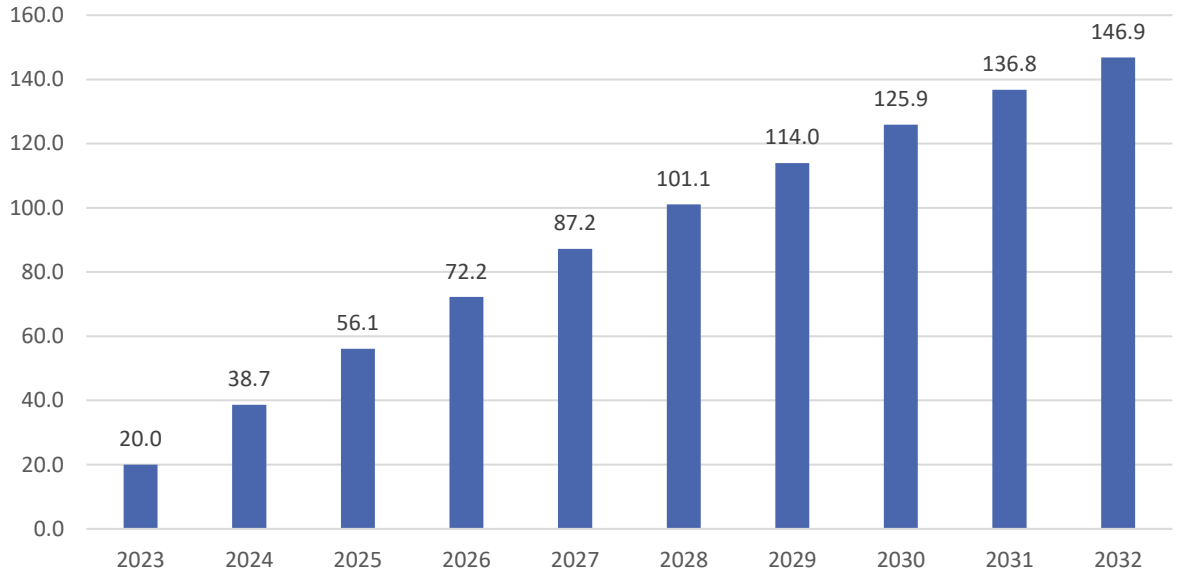
Using ONS data on internet usage by age demographic, we took the WDP 2020 data on the proportion of learners likely to reduce the number of GP visits (33%) and scaled this by the internet uptake of each demographic in comparison to the average for all demographics. The underlying assumption behind this approach is that demographics who are already more 'digitally capable' were more likely to pick up the technology more easily and change their behaviour as a result.

The average number of fewer appointments made by digital skills learners who reduced their GP interactions was 4.8 according to the most recent WDP figures. We assumed that this figure is likely to vary among different age demographics because of their respective varying healthcare needs. In addition, our estimates of the annual number of GP consultations by demographic computed from the data presented in both Hobbs et al. (2016) and Kontopantelis et al. (2021) indicate that certain demographics have on average below 4.8 GP consultations per year. We used the estimates of GP appointments by demographic for 2018/19 to scale the average number of fewer appointments made by digital skills learners, by demographic.

To estimate the number of fewer GP appointments likely to be made we applied the above methodology to the 508 thousand people who require digital skills training annually from 2023 to 2032 by demographic. Using data on the King's Fund on the cost of an in-surgery GP appointment, we multiply the costs by the number of fewer appointments we expect to be made over the group receiving digital skills support.[43] Our findings are shown in Figure 13 on the following page.

40 Hobbs, R. D. F., et al (2016) 'Clinical workload in UK primary care: a retrospective analysis of 100 million consultations in England, 2007-14' The Lancet, Vol 387, No. 10035, pp. 2323-2330
41 Kontopantelis, E., et al. (2021) 'Consultation patterns and frequent attenders in UK primary care from 2000 to 2019: a retrospective cohort analysis of consultation events across 845 general practices' BMJ Open, Vol 11, Issue 12, pp.5466
42 ONS (2021) Internet Users 2020
43 King's Fund (2022) Key facts and figures about the NHS

Figure 13: NHS savings, per annum, £m



Source: Hobbs et al (2016), Kontopantelis et al (2021), Good Things Foundation, ONS, King's Fund, Cebr analysis

From 2023 to 2032, the NHS will save 20 million for each group of 508,000 people who are trained in each year, through a reduction in GP appointments, directly because of digital upskilling of patients. In 2024, benefits will be accrued over those who are trained in both 2023 and 2024. In 2025 these benefits will be accrued from those trained in 2023, 2024 and 2025 and so on until in 2023 benefits are derived from the total 5.1 million who require digital skills support from 2023 to 2030. This is the savings generated only from the 508 thousand people who will be trained each year by an intervention to achieve full digital inclusion in the UK by the end of 2032, not including those who gain skills independently without the provision of training over this period. As such, savings range from £20 million in 2023 to £146.9 million in 2032. **Summed over the entire period, benefits to the NHS are expected to total £899 million.**

Our results are higher than in the 2018 refresh of this report. The number of people to which we have applied this methodology to has decreased since the previous refresh from 694,000 people per annum to 508,000 people per annum. As a result, the number of people who require digital skills training each year to achieve complete digital inclusion in the UK is smaller, and therefore so is the number who reduce their GP consultations because of receiving digital skills training. However, updates made to data to a key data source have worked in the other direction. We use Good Things Foundation learner survey data from the NHS Widening Digital Participation programme to form assumptions on the proportion of people who undergo digital skills training who will reduce the number of GP consultations they book and attend.[44] This shows that 33% of learners surveyed said they decreased GP consultations. The equivalent data used in the 2018 refresh of this report utilised findings from the earlier NHS WDP programme study starting in 2013, which showed that only 21% of learners decreased GP consultations following digital skills training. This has had the effect of increasing the likely NHS savings accrued from digital inclusion. Thirdly, this study is computed in 2022 prices, whereas the 2018 refresh has been computed in 2017 prices. The resulting increase in costs to the NHS per appointment has also had the effect of pushing up the monetary value saved annually. The combination of these different forces has resulted in the figures presented in Figure 13 above.

44 Good Things Foundation (2022), Digital Inclusion in Health and Care

The benefits are expected to be largely driven by adults aged 65+ and over as they have considerably more appointments per year than the other age groups, even if we take into account that they are relatively less likely to reduce the number of physical appointments. This is because they account for almost 75% of trained individuals that would reduce appointments.

4.3. Government Efficiency Savings

In 2012, the UK Government launched it's 'Digital by Default' agenda, aiming to transform public services online and in doing so make them more effective and efficient for both users and the government provider, while also substantially decreasing the costs of provision.[45] Studies undertaken at the time estimated that between £1.7 billion and £1.8 billion could be saved annually through greater digitisation of government services.[46] The Digital Efficiency Report jointly published by the Cabinet Office and the Central Digital & Data Office, states that savings are likely to be made in four key areas: reduction in staff time; estates and accommodation; postage, packaging and materials; and the costs of supporting IT systems. Significant progress has been made since the agenda's inception and the UK has become a world leader in government digitisation, reaching number two in the most recently published OECD Digital Government Index.[47] This continued progress, however, depends on uptake, which in turn depends on UK citizens being technologically capable of utilising the digital services. This section estimates the increase in uptake of online government transactional services which is likely to occur as a result of digital inclusivity, and the associated monetary savings accrued to the UK government.

In this section of the report, we estimate the efficiency savings to government through ensuring a digitally included UK by the end of 2032. The methodological process we used is described below:

- We utilised findings from the government's digital efficiency report published in 2012 which estimates the likely savings accrued to the government from the public's use of government online transactional services, as opposed to using in person, telephone or postage services. The report uses both a top-down and bottom-up approach to compute these estimates. Using the top-down approach, the report finds that at the 80% uptake level, the government will save £1.6 billion, while the bottom-up approach estimates these savings at £1.7 billion.

- Data from a Cabinet Office report[48] on the UK Government's digital strategy shows that in 2012, the year that the savings estimates were made, public uptake of government online transactional services stood at 57%. Using ONS population data on the number of people 16 and over living in the UK in 2012 we computed the resulting increase in people using government transactional services if uptake rose from the 57% estimated to be using these services in 2012, to the 80% threshold used in the digital efficiency report. Savings per person were then calculated as £41.13 using the top-down method and £42.07 using the bottom-up method.

- Taking the datapoint of 57% uptake of government transactional online services in 2012, we estimated this as a percentage of those who use the internet regularly, using historical ONS data on internet usage in the UK. We found that approximately 70% of those who use the internet regularly were also users of government online transactional services.

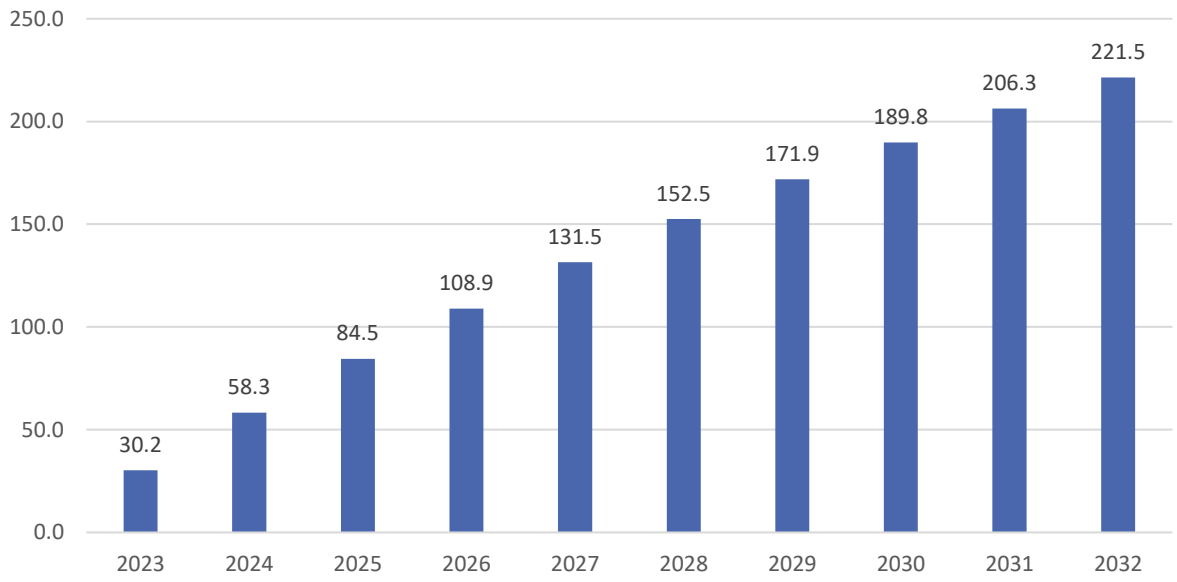
45 Cabinet Office, Government Digital Service, The Rt Hon Lord Maude of Horsham (2012) Making Public Services Digital by Default
46 Cabinet Office, Central Digital & Data Office (2012) Digital Efficiency Report.
47 OECD (2020) OECD Digital Government Index 2019 Highlights
48 Cabinet Office (2012) Government Digital Strategy

- We made the assumption that when an individual gains basic digital skills, they will be capable of using the internet and will do so regularly. Therefore, using the process described above, we assumed that 70% of those gaining basic digital skills each year will be likely to use online government transactional services, and applied this to the group gaining digital skills each year. This provided us with an estimate for the additional number of people using government online transactional services each year as a result of becoming digitally included.

- By using the top-down approach for savings per person, we found that the savings to government aggregated over the 508 thousand receiving digital skills training from 2023 through 2032 would be £30.1 million per annum. Using the bottom-up approach, this gave us £32.4 million per annum. We averaged our results across both approaches, finding that efficiency savings to government from supporting 508 thousand adults in digital skills acquisition will total £32.2 million.

Our findings presented in Figure 14 below show the estimated savings that the UK Government accrues from those who are digitally upskilled using government transactional services online as opposed to through paper forms, postal correspondence, phone calls or in person.

Figure 14: Government efficiency savings, 2023 - 2032, £m



Source: ONS, Cabinet Office, Cebr analysis

Figure 14 above displays the estimated savings that that the UK Government will receive from 508 thousand people receiving digital skills training annually from 2023 to 2032 and the resulting increase in uptake of online government transactional services. Cebr finds that in 2023, savings to the government through increased efficiency in the provision of transactional services will be £30 million, with this figure increasing to £221.5 million in the final year of the appraisal period. The benefits increase each year as benefits in 2024 will be gained from those trained in both 2023 and 2024. This continues through the appraisal period such that in 2032, the benefits generated are for every individual trained over the 10-year period. **Summed over the period from 2023 to 2032, the benefits to the government from increased efficiency of transactional services are estimated at £1,355m.**

Again, we expect that most of the benefits would be driven by a greater uptake of online government transactional services by the 65+ age group as they account for approximately 85% of individuals that would require digital training each year.

4.4. Time Savings from online transactions

The trend towards conducting personal transactions online as opposed to in person or via telephone has increased substantially in recent years. Technological advancements have meant that undertaking daily tasks such as booking dentist's appointments, train and aeroplane journeys and managing personal finances can be done from one's own home. The number of transactions and interactions that can be completed online is ever increasing, while uptake of these potential online transactions is also increasing. According to ONS data on internet banking by age group[49], from January to February 2019, 73% of all age demographics in Great Britain had used internet banking within the last three months, growing to 76% over the same months in 2020, while only 35% said they banked online in 2008.[50]

The most recently published ONS 'Internet Access - Households and Individuals' statistics[51] show that:

- Internet connections in households with one adult aged 65 years and over have increased by seven percentage points since 2019 to 80%; these households still had the lowest proportion of internet connections.

- For the first time ever, more than half of adults aged 65 and over shopped online at 54% in 2019, growing to 56% in 2020. For comparison, this figure was at 16% in 2008.

- 96% of households in the UK and Great Britain had internet access in 2020, up from 57% in 2006, when comparable records began.

These figures are representative of trends up to and including 2020, the first year of the pandemic. It is likely that the following years over which COVID-19 still had a significant effect on the economy and individual lifestyles are likely to have seen a continuation of the upwards trajectory of internet usage, as most face-to-face interactions were prohibited during the numerous lockdowns that took place in the UK. Therefore, the number of online interactions is likely to have increased significantly over the period of the pandemic; further exaggerating pre COVID-19 trends. However, it is still uncertain whether the rate of acceleration at which the internet has been adopted by UK households, seen from 2019 to 2020, is likely to persist into the long-term.

Conducting personal transactions online are expected to provide numerous benefits to users including monetary savings from shopping around for the best deals, time savings, access to a greater variety of goods and services among many others. Within this section, Cebr estimates the time savings generated from undertaking banking and government transactions online. The process used to calculate these figures is methodologically consistent with the 2018 iteration of this report. The steps taken are described below:

- **Step 1 – Estimate the time saved by conducting transactions online.** Data from the Security Identity Alliance shows that consumers save approximately 30 minutes on

49 ONS (2019), Internet banking, by age group, Great Britain
50 Financial Times (2018), Seven out of 10 people now bank online
51 ONS (2020), Internet access - households and individuals, Great Britain: 2020

each digitised transaction[52]. The most recent ONS data on government digital services combined with Cebr analysis shows that individuals make approximately 56 government transactions online per year.[53] Combining these two statistics, Cebr estimates that on average, individuals save 27.9 hours per annum by conducting government transactions online. In addition, we have utilised data conducted by One Economy, which estimates that individuals save 33 hours a year through conducting banking online, completing approximately 66 transactions.[54]

- **Step 2 – Estimate the impact of digital skills training on the number of transactions each individual conduct online.** It is assumed that once an individual has achieved a basic level of digital skills, they will be equipped to conduct essential transactions online. We have also assumed that half of all banking and government transactions will be undertaken online once a person gains basic digital skills.

- **Step 3 – Estimate the hours saved by an individual who has recently learnt basic Digital Skills.** By combining steps 1 and 2 we estimate that everyone that becomes digitally included saves approximately 30.4 hours of personal time per annum because of completing government and banking transactions online.

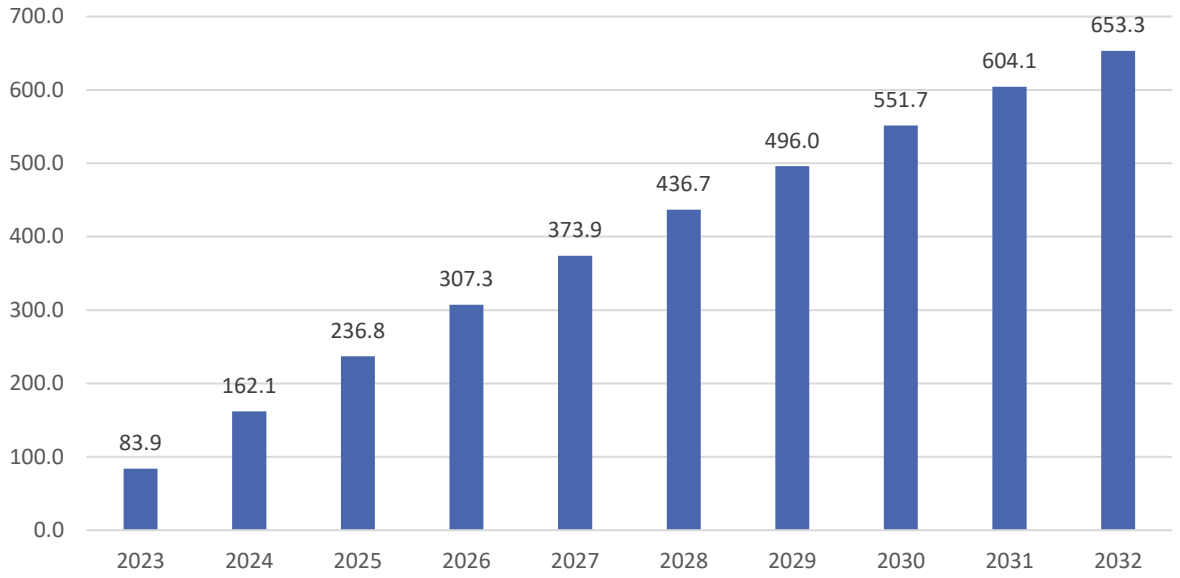
- **Step 4 – Estimate the value of the time saved.** The Department for Transport estimates the market value of leisure time, which is published in its TAG data book.[55] We have used the most recently available dataset, published in November 2021, and converted these figures into 2022 prices using a Cebr in-house macroeconomic model. Following the same logic as both the 2015 and 2018 reports, we utilised leisure time valuations within the TAG data book as these activities are mainly undertaken during individuals' personal time.

Combining the results of step 3 with the DfT data, we estimate that from 2023 to 2032, each group of 508 thousand receiving basic digital skills support each year will save 15.4 million hours at a value of £83.9 million.

Figure 15 on the following page, shows Cebr's estimates for the monetary value of time saved for individuals gaining basic digital skills and using online banking and government transactions, half of the time, as a result from 2023 to 2032. **The total value of benefits accrued to individuals through this stream sums to £3,906 million.**

52 Security Identity Alliance (2013), eGovernment services would yield up to $50bn annual savings for governments globally by 2020
53 Government Digital Service (2021), Historical Performance Platform
54 Just Economics for BT (2014), "Valuing Digital Inclusion: Calculating the social value to individuals of going online".
55 Department of Transport (2021), TAG data book

Figure 15: Individual benefits of time saved, 2023 - 2032, £m



Source: DfT, Cebr analysis

As within the 2018 report, it is important to note that while the monetary benefits presented above represent realisable financial gains, they also constitute welfare gains since the increased efficiency of the tasks included in this benefits stream allows individuals to use more of their personal time for more enjoyable pursuits even if they do not choose to invest that time into directly productive activities. Furthermore, if the performance of these tasks involved eating into work time that could not or was not made up by the employee, the appropriate monetary valuation of the time lost would be higher.

4.5. Retail transaction benefits

In this section, we estimate the monetary savings that those gaining basic digital skills are likely to make from shopping online. Like the trend toward increased transition of government and banking transactions to digital spaces, technological advancements in conjunction with consumer trends have led to an increase in online shopping in recent years. In addition to the time saved by shopping from the comfort of one's own home, individuals also benefit monetarily from making online purchases as opposed to visiting brick and mortar stores. People spend less on travel to shops and less on amenities such as consuming food and drink outside the home while shopping. They also benefit from the ability to conduct price comparisons between stores, brands and products, shopping around to obtain the best deal. According to survey data from PostNord on Ecommerce in Europe, of the UK population aged 15-79, 86% reported that they had shopped online in the past year in 2015[56], however by 2020 this figure grew to 94%.[57] COVID-19 is also expected to have fuelled shoppers' online habits, as in person shopping was not permitted during the most severe lockdown restrictions, while many other forms of recreational activity were not feasible. The latest Lloyds consumer digital index report for 2021 found that consumers who were online shoppers in 2020, have increased the number of online transactions they made by 18% since then, consequently, on average, individuals made 30 more online transactions, spending an extra £1,800 in 12 months.

56 PostNord (2015), e-commerce in Europe 2015

57 PostNord (2020), e-commerce in Europe 2020

Our analysis of this section is methodologically consistent with the 2018 iteration of this report. We utilised data from Lloyds 2017 Consumer Digital Index report which showed that individuals save an average of £444 per year by shopping online using cashback and discount sites, although only 50% of those who shop online take advantage of these tools.[58] Although Lloyds have published CDI reports annually since the 2017 report was released, we have used data from this report as the more recently released versions do not include equivalent statistics. On this data, we use an in-house Cebr macroeconomic model to convert these savings into 2022 prices.

However, not all demographics are likely to achieve the same savings as different groups have different shopping patterns and are likely to interact differently with the internet once they have gained basic digital skills. To capture these inter-demographic differences in spending within the UK economy, we use ONS household expenditure survey data on demographic spending trends. The most recently available dataset including the demographic detail necessary to compute this analysis was for the financial year ending in 2018, published in January 2019.[59] The demographic variation is shown in Table 5 below.

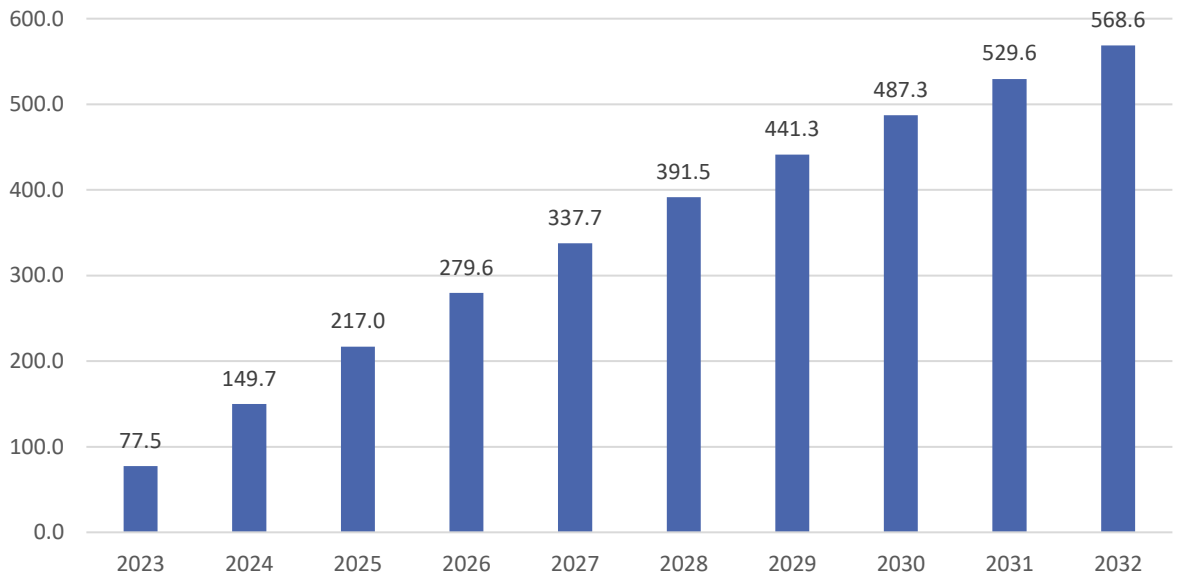
Table 5: Age demographic household spending data, variation from average, 2019

Age band	< 30	30-49	50-64	65 - 74	75+
Variation from average	-1%	14%	10%	-11%	-41%

Source: ONS

We applied this data to the 508 thousand people who require digital skills support each year, combining this with the Lloyds CDI data on the average amount saved and uptake rate of discount and comparison sites, we estimate the savings made to individuals gaining digital skills from online shopping. Our results are presented in Figure 16 below.

Figure 16: Value of transactions benefits, 2023 - 2032, £m



Source: Lloyds Banking Group/Ipsos Mori, ONS, Cebr analysis

58 Lloyds Banking Group (2017), Lloyds Consumer Digital Index 2017

59 ONS (2019), Detailed Household Expenditure Survey

Figure 16 displays the increase in individual savings that those who received digital skills training over 2023 to 2032 are likely to make, from making purchases online as opposed to in person, from utilising online price comparisons and discount sites. We estimate the average person saves £258.31 per annum in 2022 prices (accounting for Lloyds CDI £444 saving in 2017 with a 50% uptake rate). Our results show that the 508 thousand receiving digital skills training each year will accumulate approximately £77.5 million in savings annually. As the savings in each year are accrued from the total number of individuals who have received training so far in the appraisal period, the savings in each year increase in a linear fashion, reaching £568.6 million in 2032. **Over the entire appraisal period, the benefits to individuals derived from online retail transactions are estimated at £3,480 million.**

Although the average value of online transactions in a given year are smaller for those aged 65 and older, they would still be the most influential demographic, driving more than three quarter of the overall gains due to the fact that they make up for the vast majority of individuals to receive training.

4.6. Corporate Savings

In this section, we calculate the monetary benefits to corporations in the UK from operating in a digitally included society. Our benefits have been calculated in a methodologically consistent fashion to the 2018 report for Good Things Foundation, with one exception to make our analysis more robust.

The importance of digital skills in the workplace is likely to have increased over the pandemic as the extreme contagiousness of the COVID-19 virus caused the UK government to introduce work from home as a legal requirement for all non-essential jobs. As a result, many employees were required to adapt by completing work tasks remotely with the use of technology such as Zoom and Teams' meetings. However, those without basic digital skills will have been excluded from engaging in this, curtailing their individual employment options and that of employers. Corporations are expected to receive monetary gains from having access to a digitally capable work force. Data from the latest Employers Skills Survey (ESS) published in 2020 for the 2019 calendar year[60] shows that 25% of all vacancies are skills shortage vacancies, increasing from 23% in 2015 and 16% in 2011 according to the same source.

In the previous report we took data from a 2009 PWC study which estimated that between 3.5% and 7.7% of people gaining basic digital skills will gain employment as a direct result of this skill acquisition. In this 2022 iteration, we scaled this figure over time, such that our estimate for the percentage of people gaining employment starts at 5.7% in 2019 and increases gradually to 5.9% in 2032. Details of how we have calculated and utilised this data are included in step 2 below. The process of our computations took the following steps:

- **Step 1 – Estimate the number of basic digital skills vacancies that exist in the UK.** To do this, we used the most recently available ONS labour market data on data on vacancies by industry, released in April 2022[61] and incorporated it with historical vacancy by industry data to establish a time trend. We utilised this trend to forecast total vacancies in each year up to the end of the outlook period (2032). We then used responses from the ESS, from the most recent release back through to 2011 to establish trends for the growth of vacancies related to basic IT skills and computer literacy, and the proportion of these vacancies out of total UK vacancies. Combining

60 UK Commission for Employment and Skills (2020), Employers Skills Survey 2019

61 ONS (2022), Vacancies by Industry

these steps, we estimated the number of vacancies in the UK related to basic digital skills from 2019 to 2032.

- **Step 2 – Estimate the number of people likely to fill basic digital skills vacancies after becoming digitally included.** The first part of this step involved calculating the number of people who are likely to be economically active, out of the group gaining basic digital skills annually, both organically from 2019 through 2022, and because of training from 2023 to 2022. To do this, we used the most recently available data from ONS disability and employment data released in Feb 2022[62] in conjunction with Ipsos Mori data, to estimate the proportion of each age demographic that lies in each employment category (employed, unemployed or inactive). A more detailed explanation of this process is provided in step 1 of section 3.2 of this report. We then estimate, of the group who gain basic digital skills each year and are likely to be economically active, the proportion who are expected to gain a job as a direct result of being digitally upskilled. This was computed by taking the midpoint of the range (3.5% to 7.5%) taken from the PWC report, and scaling this up in line with data from the 'Employer's Skills Survey' on the average year on year change in the proportion of vacancies that are related to workers being without a basic level of IT skills between 2015 and 2021, to estimate the proportion of people who are likely to gain employment as a result of obtaining basic digital skills in each year from 2019 through 2032. The underlying logic is that the proportion of vacancies that are related to workers being without basic digital skills in each year, indicates the importance of this skill set to finding employment. As this proportion increases, as will the proportion of people gaining jobs because of gaining basic digital skills. By combining the number of people gaining basic digital skills each year with the percentage likely to gain employment as a result, we computed the number of people likely to fill the digital skills vacancies calculated in step 1.

- **Step 3 – Incorporate labour market frictions. We have aimed to capture a degree of labour market friction into our model.** Labour market friction rates exist because employers and workers are heterogenous agents, meaning that their economic wants and needs vary from one another and are not necessarily in sync. Employers may require employees at specific times, or with specific skills and experience, while employees with different skills and experience may be searching for work; the economic requirements of employers and employees is unlikely to be 100 percent always matched. Consequently, vacancies may remain unfilled by workers searching for jobs. Following this logic, we assumed a looser labour market, with a lag between the time that a person gains basic digital skills and time that they fill a digital skills vacancy. Evidence[63] suggests that in the UK labour market, 75% of individuals actively seeking a job will find one within the same year. This has been incorporated into our model such that, of those who are economically active and will eventually obtain a job, 75% will obtain one in that year, while the remainder are placed in subsequent years. This is methodologically consistent with the 2018 update of this report.

- **Step 4 – Calculate the economic benefits to corporations of filling each digital skills vacancy.** Within economic theory, a standard assumption is that a worker's contribution to the company they work for is equal to their labour productivity. Therefore, the benefit for a company of filling its' basic digital skills shortage vacancies is measured as the increase to productivity they achieve as a result. We assume that

62 ONS (2022), Disability and Employment Dataset

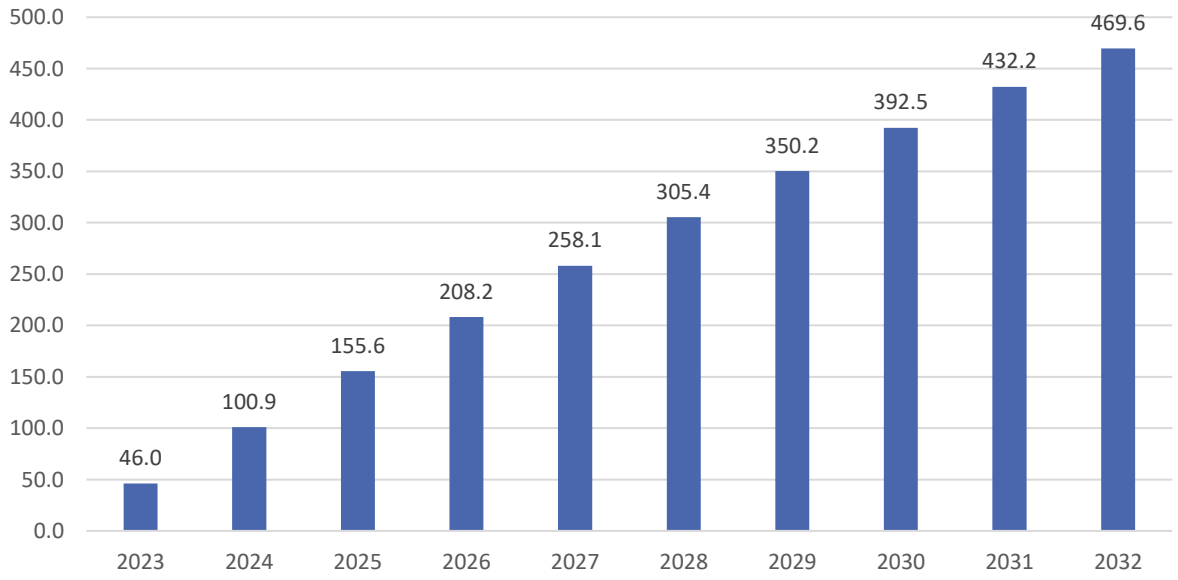
63 Gorry, A. and Munro, D. (2013), Experience, skill composition, and the persistence of unemployment fluctuations. Manuscript, Utah State University.

those without basic digital skills who fill a basic digital skills vacancy because of becoming digitally included will be on the low end of UK pay scales, as these roles require only a 'basic' level of digital skills. To quantify these assumptions, we used the latest three years of data from the Annual Survey of Hours and Earnings (ASHE) published by the ONS to calculate the wage differential between workers on the 50th and 25th percentiles of wages for both part-time and full-time workers respectively. We used this to scale the average labour productivity per worker, calculated from ONS ITL data on Gross Value Added (GVA)[64] and ONS data on the UK labour market by age group.[65]

- **Step 5 – Calculate the monetary benefits to corporations of having a digitally included UK.** This final step involves combining steps 1, 2 and 3 to estimate the number of people filing basic digital skills vacancies each year as a direct result of becoming digitally included and multiplying by our estimates for the economic benefits to corporations for filling each basic digital skills vacancy.

Figure 17 below shows the annual and cumulative savings to corporations accrued in this way and aggregated over those being digitally trained from 2023 to 2032. The annual corporate benefits increase each year due to the delay between individuals gaining skills and finding employment as a result (described in step 3) in addition to annual increases in the percentage of people gaining basic digital skills that will acquire a job as a direct result, as described in step 2 of this section of the report. Annual corporate benefits increase from £46 million in 2023 to £469.6 million in 2032. **Over the period from 2023 to 2032, the savings made by corporations from 508 thousand people receiving digital skills support annually, sum to £2,719 million.**

Figure 17: Corporate Monetary Benefits, 2023 - 2032, £m



Source: ONS, Cebr analysis

64 ONS (2021), Regional Gross Value Added

65 ONS (2022), Labour Market by Age Group

4.7. Employment

In this section, we quantify the monetary benefits to individuals gaining employment because of becoming digitally included.

As mentioned in earlier sections of this report, the development of basic digital skills can enhance an individuals' success in the job market. Those with basic digital skills can search for and apply to jobs online and as a result are aware of, and have the potential to attain, a much wider variety of roles. Meanwhile, those who are digitally excluded are also excluded from applying to many jobs, as most vacancies in the UK are advertised online. Exclusion in this way has become increasingly severe in the last 20 years, with online jobsites becoming the most prevalent form of job advertisement. The Institute for Employment studies asserts that 'the internet has caused the largest change to the recruitment landscape… acting as a conduit between employers and jobseekers.' [66] The report also stated that the proportion of companies who only allow applicants to apply for jobs via a corporate careers website increased from 27% in 2000 to 77% in 2005. This figure is expected to be much higher in 2022. Those who are fully capable of using the internet but do not have all the digital skills required to be digitally included also face hurdles when searching for jobs. According to data released by recruitment site 'Monster', as of 2021, Britain is leading the way when it comes to virtual onboarding, with 74% of employers using virtual technology for at least half of all candidates interviewing and new-hire onboarding, while over 15% of UK recruiters have gone fully virtual in their recruitment process.[67]

Those who are digitally excluded are excluded from undertaking roles which require a basic level of digital skills to complete. According to research published in 2019 by the department for Digital, Culture, Media and Sport in conjunction with Burning Glass Technologies, a software analytics firm operating in the labour market, digital skills are essential entry requirements for 82% of online job vacancies.[68] This is expected to have become even more significant since the pandemic, with work from home mandates for non-essential jobs over many periods of the pandemic years. Consequently, those without basic digital skills are currently excluded from a large section of the UK labour market.

Within the 2018 iteration of this report, we presented data from the McKinsey Global Institute showing that online talent platforms could boost global GDP by 2% by 2025, while increasing employment by 72 million full-time equivalent positions.[69] This study also implies that these platforms have the capability to reduce the duration of employment, estimating that as many as 230 million people could find new jobs more quickly. Moreover, this study further implies that platforms such as these can reduce skills mismatches and minimise labour market frictions, suggesting that up to 60 million people could find roles more tailored to their abilities or preferences and an additional 50 million people could move from informal to formal employment.

There are benefits likely to occur in the labour market because of achieving a digitally included society, with some unemployed individuals receiving digital skills support, likely to gain employment as a direct result. The following steps were taken to estimate these benefits:

- **Step 1 – Estimate the proportion of people likely to gain a job because of becoming digitally included.** We utilise data from a PWC study[70] to estimate the proportion of those gaining basic digital skills each year that will gain employment as a direct result. Using this data, we estimate that 5.7% of those gaining basic digital

67 Monster (2021) Global Recruitment Report
68 DCMS and BurningGlass (2019) No Longer Optional: Employer Demand for Digital Skills
69 McKinsey Global Institute (2015) Connecting Talent with Opportunity in the Golden Age
70 PWC (2009) Champion for Digital Inclusion: The Economic Case for Digital Inclusion

skills will gain employment as a direct result of becoming digitally included in 2019, this figure increases gradually each year to reach 5.9% in 2032.

- **Step 2 – Estimate the number of unemployed people gaining basic digital skills each year, likely to obtain work as a result of gaining basic digital skills.** This proportion calculated in step 1 is then applied to the 4.3 thousand individuals who we expect to gain basic digital skills each year and are likely to be unemployed. Details of how the economic activity status of individuals becoming digitally included are explained at the end of section 3.1 of this report. Combining these steps, we obtain an estimate for the number of people gaining basic digital skills each year who are expected to be unemployed before gaining skills and find work because of becoming digitally upskilled.

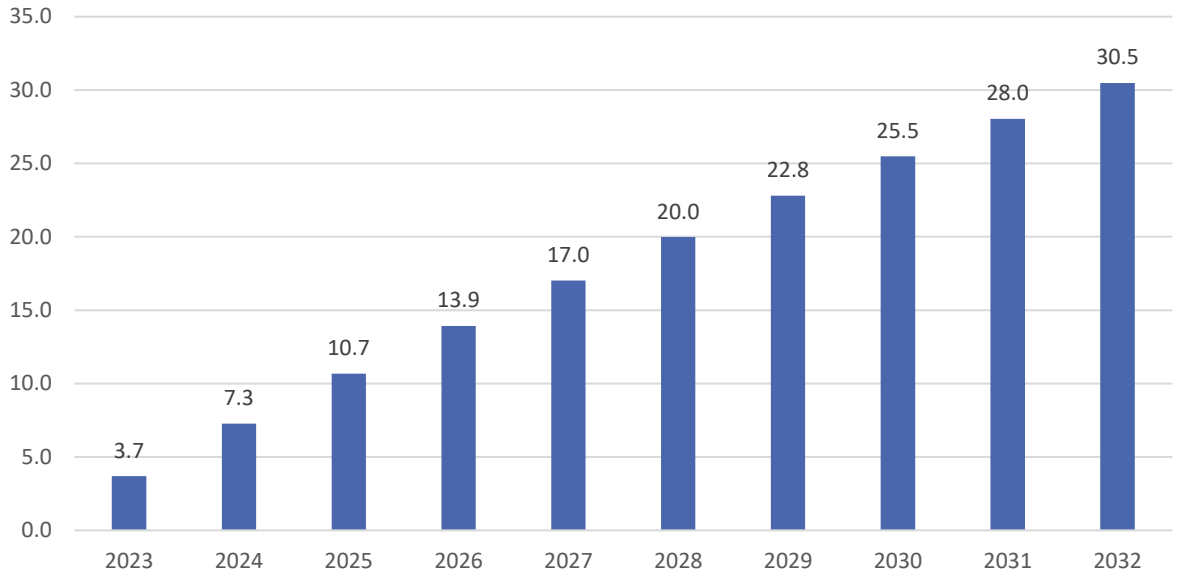
- **Step 3 – Calculate the earnings of those finding work because of gaining basic digital skills.** The Annual Survey of Hours and Wages (ASHE) publishes data on earnings of workers across all Standard Occupational Classification (SOC) professions in the UK. We utilise the ASHE dataset published for each available year included in this study, taking the lowest earnings quartile as representative of the salary that an individual who gains employment because of learning basic digital skills is likely to earn. These wages are then scaled up in each year, using an Cebr's in-house macroeconomic model. Using this method, we find that the lowest quartile of earnings is likely to range from £15,532 per annum in 2019 to £23,466 per annum in 2032, inclusive of both full and part-time workers. Multiplying these wages by the group likely to find work because of becoming digitally included and were likely to be unemployed beforehand, we obtain estimates for the additional wages earned through the unemployed gaining employment as a direct result of becoming digitally skilled. Cebr estimates that these earnings amount to £4.6 million in 2023 the first year of the outlook period, and increase gradually year on year, to reach £6 million in 2032.

- **Step 4 – Remove money paid in taxes to the UK government.** Of the additional earnings generated by those gaining employments following digital upskilling, not all will be kept by the employee, as a portion will be paid to the government in income tax and national insurance contributions. We remove this portion from the total employment benefits to avoid double counting, as the increase in government tax revenues resulting from digital inclusivity are calculated separately in section 4.8 of this report. To compute this, we utilise the breakdown of those gaining basic digital skills each year by age and economic status as described in step two of section 2.1, the likely earnings achieved from those who gain employment following digital upskilling and use an in-house Cebr tax model to calculate the value of national insurance and income tax contributions made to the government from this group. This is subtracted from the total earnings estimated to be made by those gaining employment because of becoming digitally included to isolate the monetary benefit that goes to the individual gaining digital skills.

The steps detailed above are consistent with the methodology used in the 2018 report. However, the 2018 analyses also included an assumption that some learners receiving external assistance to gain digital skills who are currently economically inactive (not employed or looking for work) would gain employment as a result of acquiring basic digital skills. In the current iteration we have removed this assumption, to increase the robustness of our results. This has the effect of reducing the benefits generated through the employment stream.

Figure 18 below shows the results of the aforementioned methodology aggregated over those who receive digital training from 2023 to 2032.

Figure 18: Monetary increase in Employment, 2023 - 2032, £m



Source: ASHE, PWC, Cebr analysis

Following the removal of the government revenue from these earnings, the benefits generated from the 508 thousand who receive digital skills support, generates £3.7 million in year. As with the other benefits streams included in this report, total benefits accrued in each year are generated from all of those who have received digital skills support in that particular year and in the years preceding it. With this in mind, our results of the annual benefits from this stream are presented above in Figure 18. Benefits start at £3.7 million in 2023 and increase to £30.5 million in 2032. **Over the ten-year period to 2032, benefits in the form of increased earnings from those who find employment as a direct result of receiving digital skills support sum to £179 million.**

4.8. Earnings

This section estimates the increase in earnings of the estimated 33.2 thousand who require basic digital skills support annually and are already employed.

Digital skills are increasingly becoming essential requirements for many jobs as digitisation within the workplace accelerates. In 2019, 82% of online job vacancies included digital skills as an essential requirement.[71] The pandemic is expected to have strengthened this trend as the work from home mandates for all non-essential workers meant that most employees were expected to be capable of the digital skills required for remote working. The acquisition of digital skills is also expected to increase worker productivity, enabling employees to become better at their current roles or move to higher paid positions, which in turn enables them to bargain for increased wages. A 2022 Australian study conducted by RMITOnline and Deloitte found that job advertisements seeking applicants with digital skills attract a 9% wage premium, although on average employer's state that they're only willing to pay 6% more.[72]

71 DCMS and BurningGlass (2019), No Longer Optional: Employer Demand for Digital Skills
72 RMIT Online and Deloitte (2022), Ready, Set, Upskill - Effective Training for the Jobs of Tomorrow. NB This applies to all digital skills, not just basic digital skills.

An increase in employee earnings is expected to provide a boost to the economy, as individuals who earn more are likely to spend more. Increases in household spending drive up purchases on goods and services within the wider economy. As businesses benefit from increased demand and revenue, this will have positive knock-on effects in the UK's business economy.

In this section, we quantify the increase in earnings that those gaining basic digital skills are likely to achieve. Our methodology is consistent with that used in the 2018 version of this study, with the caveat that the number of people and demographic make up of those who require digital skills support each year has changed, as has earnings data. The core methodological approach entailed the following:

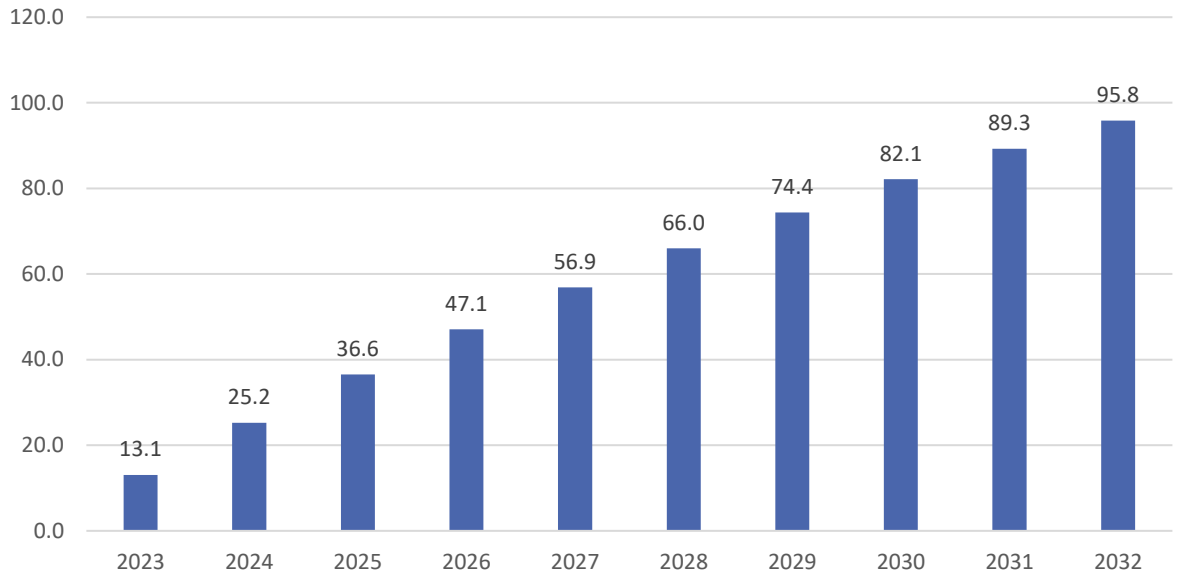
- **Estimate the increase in wages achieved because of gaining basic digital skills.** In line with the 2018 iteration of this study, we utilise research from the Centre for Education and Economics[73] conducted in 2007, to make a conservative assumption that individuals who learn basic digital skills can expect an increase in their hourly earnings of 2.8%. It is important to note that this figure refers specifically to 'basic' digital skill acquisition; those who have more advanced levels of digital skills are likely to see an even larger increase in earnings.
- **Obtain breakdowns of employed disabled and non-disabled learners respectively, by age and occupation.** Of the 33.2 thousand learners we expect to be in employment annually, we estimate that 12.7 are disabled while 20.5 are non-disabled. We utilise LFS data on employed disabled people by occupation and employed disabled people by occupation to provide a breakdown of these two groups by likely occupation. There are nine occupational categories included. These estimates were then disaggregated further to generate breakdowns of employed learners by age, disability status and occupation.
- **Calculate the pre and post upskilling value of wages.** The Annual Survey of Hours and Wages (ASHE) provides data on hourly earnings by age and occupation along with average number of hours worked. We applied this data to our breakdown of disabled employed learners by age and occupation, and non-disabled learners by age and occupation respectively to obtain estimates for the current earnings for these groups, before they receive digital skills support. The 2.8% earnings uplift is then applied to these hourly wages and the process repeated to obtain an estimate of likely earnings following the acquisition of basic digital skills. The difference is the overall increase in earnings resulting from this group receiving digital skills support.

To avoid double counting, we remove income tax and employees NICs from the increase in earnings generated through this benefits stream. These are then added into the government revenue benefits stream in section 4.8.

Figure 19 below displays our findings for the increase in earnings generated by the digital upskilling of those who require digital skills training from 2023 to 2032. These figures represent net earnings, i.e., the difference in earnings generated from the acquisition of basic digital skills rather than total earnings of those becoming digitally included. We estimate in 2032, the net increase in earnings for the 508 thousand who receive digital skills support will be £13.1 million in net benefits. This increases to £95.8 million in the final year of the appraisal period. Our figures for the estimated benefits accrued through this benefits stream in each year are presented in Figure 19. **Over the entire appraisal period, we find that benefits from increased earnings of those employed sum to £586 million.**

73 Centre for the Economics of Education (2007), "The Impact of Computer Use, Computer Skills and Computer Use Intensity: Evidence from WERS 2004".

Figure 19: Increase in Earnings, 2023 - 2032, £m



Source: ONS, Cebr analysis

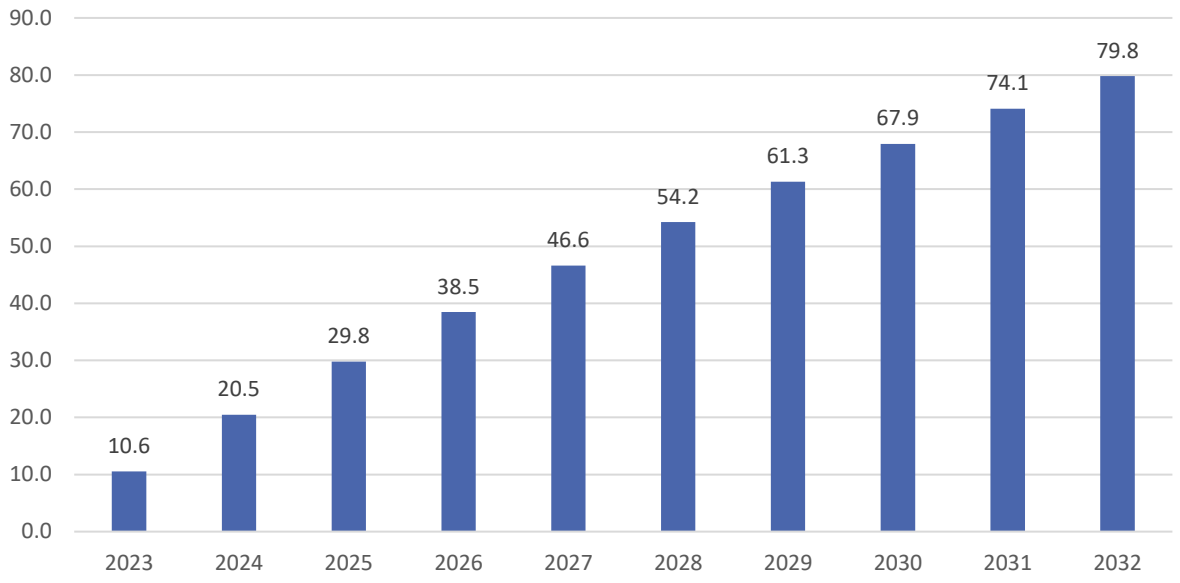
Less than 30% of the benefits are expected to relate to those over the age of 65 as more than 90% of people in this group are economically inactive.

4.9. Government Revenue

The government revenue benefits stream sums the increase in government tax revenue from the increase in earnings from the earnings section, the increase in tax revenue gained from those who were previously unemployed, but now employed because of gaining basic digital skills in the employment section, and additionally, factors in the decrease in JSA payments to those who have gained employment through becoming digitally skilled (who were previously unemployed, not economically inactive). The specific taxes calculated include income tax, employee's national insurance contributions (NICs) and employers' NICs.

In 2023, £10.6 million was generated through the earnings benefits stream. The breakdown of this figure is as follows: £1 million in JSA reduction, £4.1 million in additional income tax, £3 million in additional employees NIC and £2.7 million in additional employers NICs. Figure 20 below, displays the annual and cumulative increase in government revenue generated from those who receive digital skills training each year from 2032 to 2032. We find that the additional government revenue generated from achieving a digitally inclusive UK by 2032, will sum to £10.6 million in 2023, increasing to £79.8 million in 2032. **For the entire ten-year period from 2023 to 2032, the monetary increase in government revenue through increased earnings and employment of those who receive digital skills support is estimated at £483 million.**

Figure 20: Increase in Government Revenues, 2023 - 2032, £m



Source: ONS, Cebr analysis

4.10. Environment

In this refresh of the report, an additional benefit stream has been included to investigate how digital upskilling can aid in the UK's progression towards achieving a green and sustainable economy. For most jobs which are capable of being conducted by employees working from home, basic digital skills are a requirement to complete tasks and remain connected to employers and colleagues. Those who are digitally excluded are unable to fill these roles, and as a result will be unable to cut their personal CO2 emissions from commuting in this way.

In October 2021, the government published its Net Zero Strategy, setting out how the UK can transition to a net zero economy by 2050.[74] A central focus of this strategy involves significant efforts towards decarbonisation, including an objective to fully decarbonise the UK's power supply by 2035, ensuring that the primary source of the UK's energy lies in clean electricity, while upscaling the production of low carbon alternatives such as hydrogen and biofuels. The strategy also includes a Zero Emissions Vehicle (ZEV) mandate encouraging the use of electric vehicles, committing to focus on improving public transport and ending the sale of new petrol and diesel cars by 2030. Over 2020, the COVID-19 pandemic and associated lockdowns resulted in a significant reduction in CO2 emissions in the UK. UK Government figures show that a sharp reduction in personal travel including commuting to work drove household greenhouse gas emissions down by 15 million tonnes of CO2 equivalent in 2020.[75]

Within this environmental benefits stream, Cebr estimates the reduction in CO2 emissions likely to result from achieving a digitally included society by 2032, and the resulting monetary benefit to society. Our process of computation can be summarised into the following steps:

- **Step 1 – Compute the number who are employed, of the 508 thousand who require digital skills support annually.** To obtain an estimate for the number of people who require digital skills support annually from 2023 to 2032 and are employed,

74 HM Government (2021), Net Zero Strategy: Build Back Greener
75 ONS (2021), COVID-19 restrictions cut household emissions

we summed those who require digital skills training and are disabled and employed and are non-disabled and employed. Further details of how this was computed are included at the end of section 3.1. Our results show that approximately 33.2 thousand people who require an external digital skills support per annum are likely to be in employment, 4.3 thousand are unemployed and 470.8 thousand are likely to be economically inactive.

- **Step 2 – Estimate the type of employment those employed and gaining digital skills have.** This step involved splitting those who require digital skills training and are likely to be employed, into those who work full and part time respectively. We computed this using Annual Population Survey (APS) data on full-time and part time workers in the UK, in the most recent year for which data exists (2021). ONS data suggests that from 2019 to 2020, the proportion of working adults who had a work from home (WFH) element in their jobs increased from 27% to 37%.[76] More recently, a Sky news report using ONS statistics indicated that despite the announcement of the Prime Minister on 20 January 2020 ending the guidance for employees to WFH, between 19 January and 30 January, 36% of working adults reported having worked from home at least once in the last seven days.[77] It appears that flexible working is set to become a long-term trend in the UK, and therefore we used the most recently available sky data to assume that 36% of employees would have a WFH element in their jobs in every year of the outlook period. From this, we estimated the number of people requiring digital skills training who were employed with a WFH element in their jobs, working full time and part time respectively. We have used the assumption that gaining basic digital skills will enable an individual to WFH, at the same rate as does the general population in the UK.

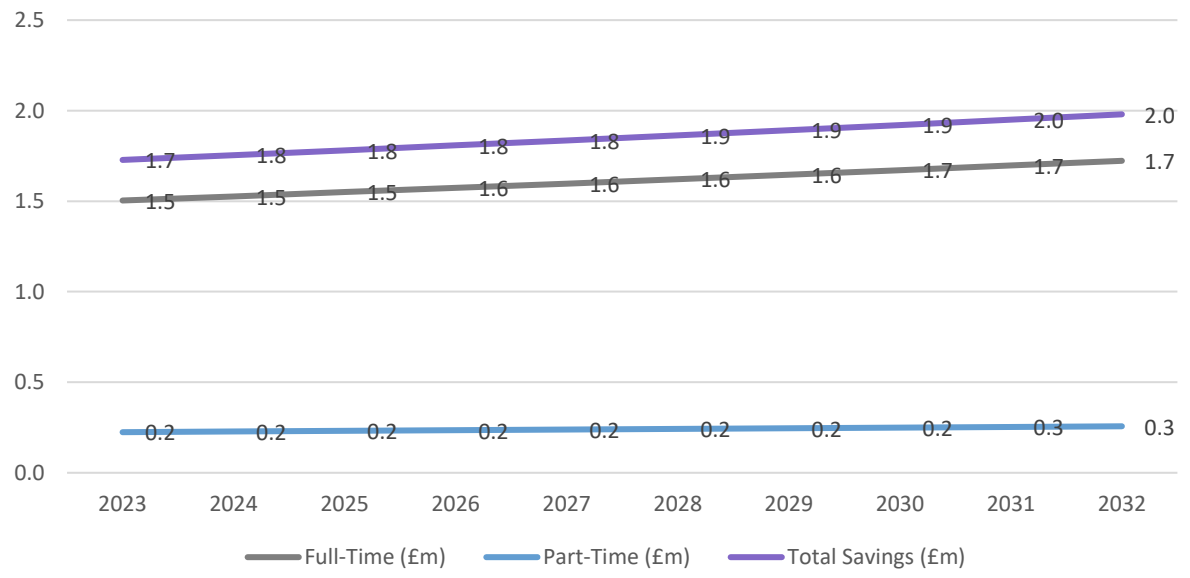
- **Step 3 – Compute the kilometres fewer travelled because of digital skills acquisition.** This involved obtaining the average hours worked per week from the ONS' Labour Force Survey, for both full time and part time workers, and combine with data[78] on the average number of WFH days per week for a worker with a flexible working job (job with a WFH element). We used this to estimate the number of days worked from home per week for full time and part time workers with flexible working jobs respectively, and thus the number of fewer commuting journeys for workers with a WFH job in each employment category. Statistics from the Department of Transport's 'National Travel Survey'[79] show that in 2019 approximately 61.8% of full-time workers and 60.4% of part time workers commuted by cars. These figures increased to 73% and 64% respectively in 2020, the most recent year for which data exists at the time of analysis. Because the UK faced more severe lockdown restrictions during 2020, we have assumed that data for 2019 is more indicative of long-term trends, and therefore use this data for every year of the outlook period. Combining these statistics with our above analysis, we estimate the number of fewer car journeys now taken as a direct result of digitally upskilling those who require support and training. Data from the RAC foundation shows that the average commuter trip is 9.9 miles, converted into kilometres this is 15.9km. Using the above methodology, we calculate those 52.9 million fewer kilometres will be travelled each year of the outlook period by those who receive digital skills training and are likely to be in employment. We estimate that the kilometres fewer travelled by those gaining digital skills during the nowcast period is much higher during the nowcast period.

76 ONS (2021), Business and individual attitudes towards the future of homeworking, UK: April to May 2021
77 Sky News (2022), One third of Britons still working from home despite rule changes, data show
78 Duome (2021), Hybrid working calculator - how different hybrid workstyle impact office space
79 Department for Transport (2021), National Travel Survey

- **Step 4 – Compute CO2 less emitted and associated monetary savings.** The Department for Transport estimates the value of CO2 per tonne in 2010 prices. Using the most recently published version of this data, released in November 2021, we use an in house Cebr model to convert these figures into 2022 prices. These range from £277.27 per CO2 tonne in 2023 to £317.67 in 2032. Vehicle Licensing Statistics, also published by the Department for Transport, estimate the CO2 emissions per car by year of registration plate. Using this data, Cebr calculates those average emissions are 164.6 grams of CO2 per kilometre. We combine this with our estimates for the number of fewer kilometres travelled for those gaining digital skills who are employed, and data on the monetary value of CO2 emissions.

Figure 21 below displays the monetary savings generated by the 33.2 thousand employed individuals who require external digital skills assistance and are employed in each year, broken down by part-time and full-time workers respectively. The data shows only the savings generated from people trained in each year, and not the actual annual savings which will include benefits from those trained in all previous years also.

Figure 21: Savings from CO2 reduction of those employed receiving digital skills training, 2023 - 2032



Source: ONS, RAC, DfT, Cebr analysis

From Figure 21 we can see that savings from those expected to be working full time are on average 6.7 times larger than the savings generated from those expected to be working part-time. There are two reasons for this, firstly, the number of people receiving digital skills training and working full-time in each year of the is approximately three times larger than those working part-time and secondly, those working part-time work approximately half the number of days of those working full time, therefore, the reduction in kilometres travelled because of becoming digitally included is smaller for this group. Annually, these benefits start at £1.7 million in 2023 and increase gradually to 2 million in 2032. The reason for the year-on-year increase in the monetary value of the CO2 reduction is because, according to statistics published by the Department of Transport, the monetary value of CO2 increases over time, above inflation.

However, the above analysis does not show the full picture, as it is likely that certain people who become digitally included each year, gain employment as a result. This group is likely to

increase their CO2 output as the number of commuting journeys they take increase from a level much closer to zero.

PWC utilised existing literature to identify that between 3.5% and 7.5% of unemployed people are likely to find work because of obtaining digital skills.[80] We scaled this up, in line with data from the 'Employer's Skills Survey' on the average year on year change in the proportion of vacancies that are related to workers being without a basic level of IT skills between 2015 and 2021, to estimate the proportion of people who are likely to gain employment because of obtaining basic digital skills in each year from 2019 through 2032. The underlying logic is that the proportion of vacancies, which are related to workers being without basic digital skills in each year, indicates the importance of this skill set to finding employment. As this proportion increases, the proportion of people gaining jobs will also increase because of gaining basic digital skills. This figure starts at 5.7% in 2019 and increases gradually to 5.9% in 2032.

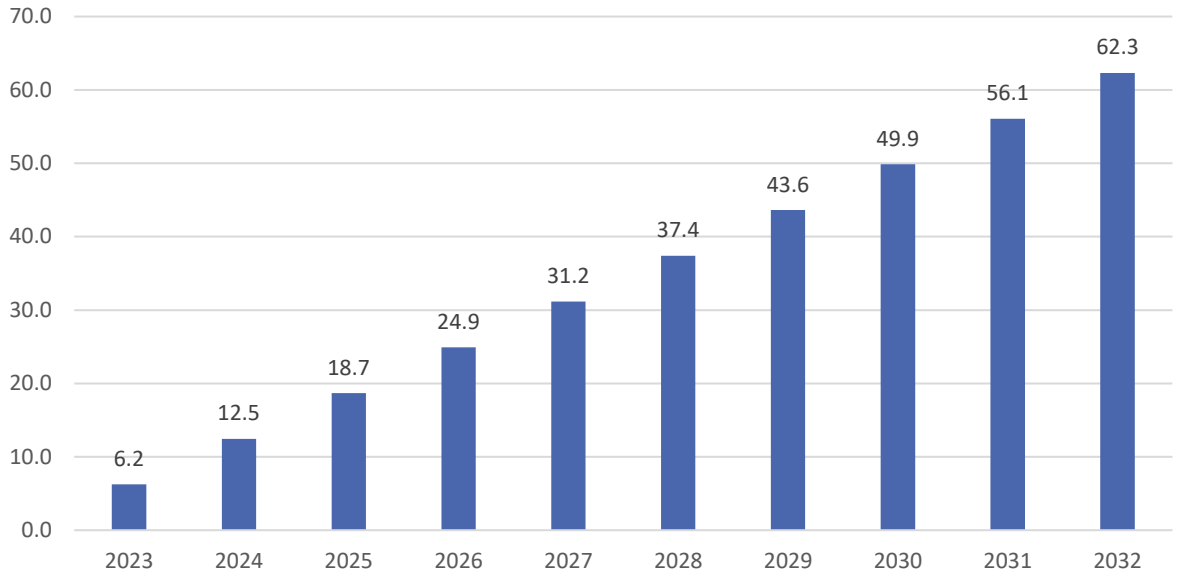
We took the assumption that the group of people gaining employment because of becoming digitally included are likely to work from home at the same rate as does the general population. There is a risk that this assumption overestimates the work from home rate of those who gain employment because of receiving digital skills support, as these individuals are likely to be on the lower end of income scales, gaining work in roles that are less likely to have flexible working options.

We followed the same process using the same datasets as for the group of people gaining basic digital skills and are likely to be employed, to estimate the increase in CO2 emissions and associated monetary value for the group of people gaining employment because of becoming digitally included.

Figure 22 below shows the net decrease in CO2 emissions that is likely to occur from those receiving digital skills support who are employed, netting out the increase in CO2 emissions likely to result from those entering the workforce as a result of gaining digital skills. Cebr estimates that the UK population will emit approximately 6.2 thousand tonnes of CO2 less in 2023 and 62.3 thousand tonnes less in 2032, as a direct result of achieving digital inclusivity in the UK by 2032. This sums to a total reduction in CO2 emitted over the entire period from 2023 to 2032 of 342.8 thousand tonnes.

80 PWC (2009), Champion for Digital Inclusion: The Economic Case for Digital Inclusion pp.32

Figure 22: Net CO2 emissions decrease, thousand tonnes, 2023 - 2032

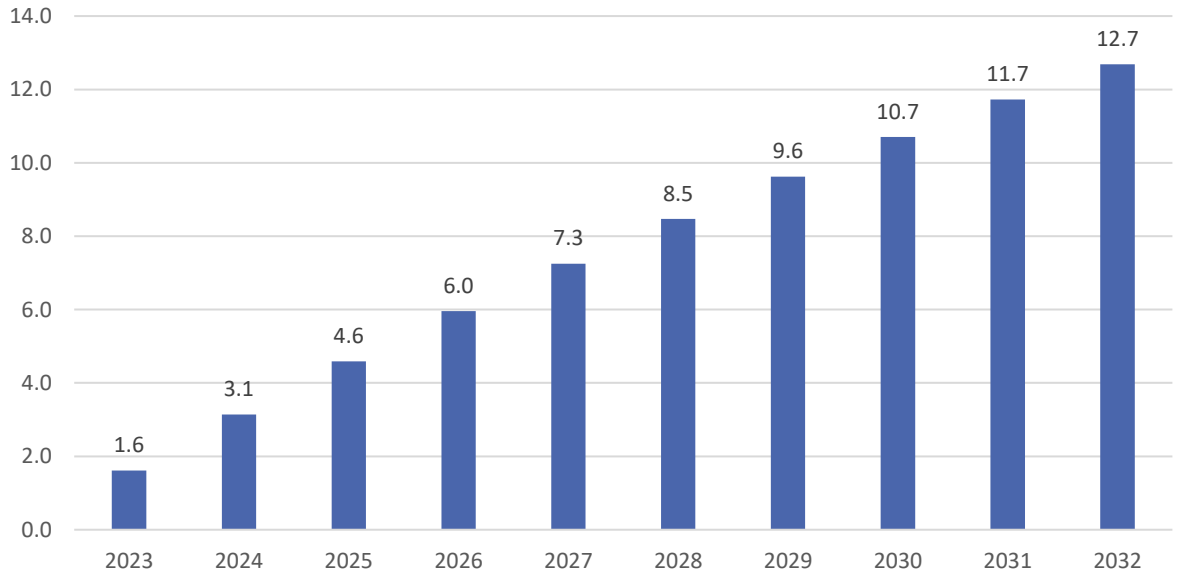


Source: ONS, RAC, DfT, Cebr analysis

The results shown above include the reduction in CO2 estimated to be saved from those gaining digital skills who are currently employed, and the increase in CO2 that Cebr estimates will be emitted because of those gaining employment as a consequent of becoming digitally included.

The associated monetary benefit to society of the net CO2 reduction is displayed in Figure 23 below in 2022 prices. Cebr finds that £1.6 million is saved from the above-described methodology in 2023, increasing to £12.7 million in 2032. **Over the entire ten-year period from 2023 to 2032, the increased value to society from CO2 reduction of those who receive external digital skills assistance sums to £76 million.**

Figure 23: Monetary value of net CO2 reduction, £m, 2023 - 2032



Source: ONS, RAC, DfT, Cebr analysis

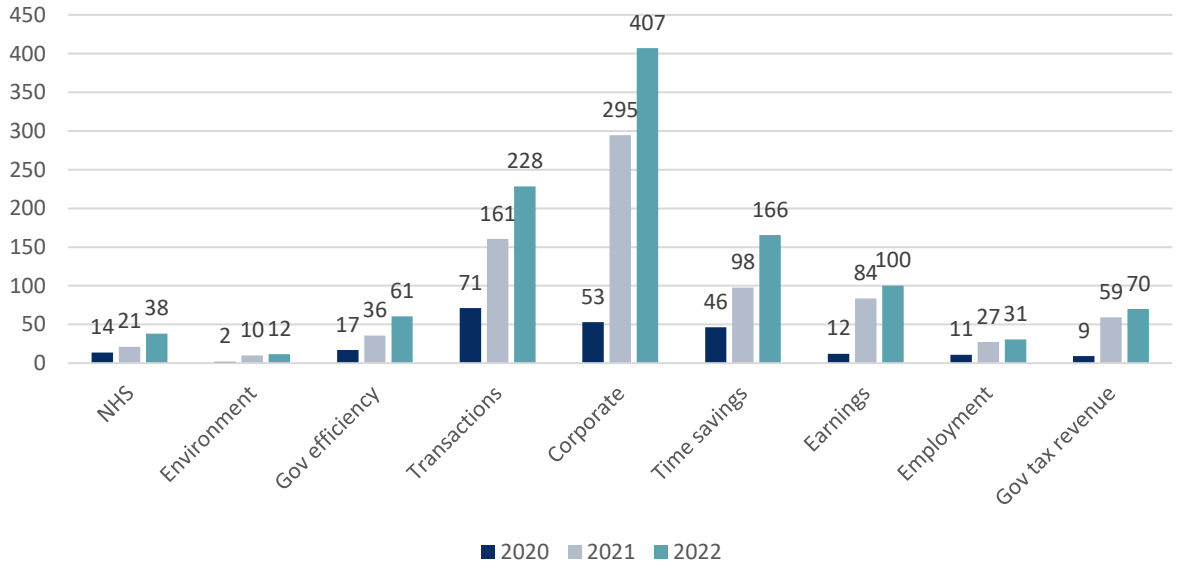
5. Nowcast

This section of the report provides an overview of our estimates of those who gained digital skills for life from 2020 through 2021, and the resulting monetary benefits likely to have been accrued through each benefits stream as a result.

Lloyds Essential Digital Skills Tables show that from 2019 to 2021, there has not been a blanket improvement in the acquisition of EDS for life. While overall, the number of adults in the UK with EDS for life increased, this was not the case for all demographics. Data from Lloyds Banking Group shows that the percentage of adults aged 75 and above that did not qualify as being able to complete all five tasks required to have the Essential Digital Skills for life, increased from 70% in 2019 to 74% in 2021. The changes seen over the pandemic in the digital skill levels of older generations holds increasing weight because the percent of the population that they account for is expected to increase over time as the UK's population ages. ONS data suggests that those aged 75 and over accounted for 10% of all UK adults in 2019, increasing to 11% by 2021. Although this doesn't appear to be a huge increase, summed over all those in this age category, the decline in digital skills indicated by Lloyds Banking Group data has a significant impact on the total number of people in the UK without basic digital skills.

Applied to ONS population estimates, this indicates that in 2019, 4.0 million in this age demographic were without EDS for life, increasing to 4.4 million in 2022. This increase in the number of people without EDS for life in this specific age group amounts to an economic loss for society, the opportunity cost of these individuals not being able to benefit from the nine streams considered in section 3 of this report. We calculate this opportunity cost and factor into our analysis of the monetary benefits derived from those who gain digital skills over the pandemic years (2020 – 2022), from each of the benefits streams considered. Our results are presented in Figure 24 below.

Figure 24: Monetary benefits of those gaining digital skills over the pandemic, 2020 - 2022, £m



Source: ONS, Lloyds Banking Group, Cebr analysis

The annualised savings in this period are not associated with any training. They are larger than those forecast over the outlook period due to the much larger number of people who are

gaining basic digital skills in each year of this period than require an intervention of digital skills training annually from 2023 to 2032.

Summed over all the benefits streams, the total benefit to the economy from those who gained digital skills from 2019 to 2020 is estimated at £235 million. This figure is £791 million for 2021 and £1,113 million for 2022.

6. Comparing the costs and benefits of supporting digital inclusion

In this section we present the results of our cost-benefit analysis of investing in digital inclusion. This entails discounting all costs and benefits to present day values and then compute the ratio of those costs and benefits for the appraisal period. This methodology allows us to robustly compare the costs and benefits of investing in digital inclusion over the next ten years to assess if this investment is worthwhile from the perspective of society and Government.

6.1. Methodological approach

Sections 2 and 3 provide the estimated costs and benefits associated with a scenario in which investment is made to ensure that all UK adults learn Basic Digital Skills. This involves supporting the learning process of 508 thousand people every year from 2023 to 2032. One of the most important steps in correctly assessing the value of this investment is to incorporate in the modelling exercise the fact that people generally prefer to receive benefits as early as possible while paying costs as late as possible. Therefore, the time at which benefits and costs occur affects their value to individuals. To guarantee that everything is on comparable terms and reflects this time preference, we need to determine the present value of both costs and benefits. This is done by discounting the cash flows; we use a standard discount rate of 3.5%, as stipulated in HM Treasury's Green Book guidance on appraisal and evaluation in central government.[81] Similar to the 2018 and 2015 reports, we present the comparison of the costs and benefits of this investment in two different ways:

- ***Net Present Value (NPV)*** *- The NPV is the sum of the discounted cash flows over the period. This criterion is simply based on whether the sum of discounted benefits exceeds the sum of discounted costs. The minimum criterion for a project to be deemed worthwhile is for the NPV to exceed zero. However, it is often the case that projects require a larger margin to take into account unknown risks and uncertainties.*

- ***Cost Benefit Ratio (CBR)*** *– The CBR represents the ratio of discounted benefits to discounted costs. A ratio greater than one indicates that the project should go ahead because benefits exceed costs. But other factors, such as the size of investment, funding options, risk, optimism bias, sensitivities to budget overruns and sensitivities to overestimation of benefits should also be taken into account. Generally speaking, a large cost benefit ratio would normally indicate that benefits are sufficiently large to exceed costs, even at the limits of sensitivity analysis thresholds.*

81 The Treasury's Green Book sets out the definition and de-construction of the Social Time Preference Rate (STPR). The STPR is the rate used for discounting future benefits and costs in order to trade-off the value society attaches to present, as opposed to future consumption.

6.2. Results Table

The table below presents a summary of the costs and benefits of investing in digital inclusion. When all costs and benefits to learners, businesses and the Government are taken into account, **we estimate the NPV for the 10-year investment to be £12.2 billion (2022 prices), and the CBR to be 9.48.**[82]

Table 6: Summary of costs and benefits, 2022 prices, 2023 - 2032, £m

	NHS	Gov Efficiency	Time Savings	Transactions	Corporate	Employment	Earnings	Gov Tax Revenue	Environment	Total Benefits	Costs
2023	20	30	84	77	46	4	13	11	2	287	182
2024	39	58	162	150	101	7	25	20	3	566	173
2025	56	85	237	217	156	11	37	30	5	832	164
2026	72	109	307	280	208	14	47	38	6	1,082	155
2027	87	132	374	338	258	17	57	47	7	1,316	147
2028	101	152	437	391	305	20	66	54	8	1,536	139
2029	114	172	496	441	350	23	74	61	10	1,741	131
2030	126	190	552	487	392	25	82	68	11	1,933	124
2031	137	206	604	530	432	28	89	74	12	2,112	117
2032	147	221	653	569	470	30	96	80	13	2,279	111
Total	**899**	**1,355**	**3,906**	**3,480**	**2,719**	**179**	**586**	**483**	**76**	**13,683**	**1,443**

The table above shows the results of our analysis when a discount factor of 3.5% is applied to net present value calculations, as per HM Treasury 2022 guidelines.

82 The benefits estimated in Section 4 are cumulative benefits over 10 years, which is equivalent to the figures under the column heading “Year 10” or “2032”. The NPV is the sum of the discounted cash flows over the period of the entire investment. This criterion is simply based on whether the sum of discounted benefits exceeds the sum of discounted costs, which are presented under the “Total (present value)” column.

6.3. Summary of the results

Our overall findings show that for every £1 invested in supporting those without basic digital skills to achieve the level of skill defined by the Lloyds Banking Group as the Essential Digital skills for life £9.48 is generated in the UK economy.

Without any intervention, the number of people without basic digital skills is estimated to reach 5.8 million adults by the end of 2032. This represents 5.8 million people who are likely to face increasing social and economic exclusion as digitisation in the UK increases and permeates farther into all facets of life in the UK. The good news is that the number of people gaining skills organically without the need for external assistance is expected to continue to grow; we estimate that from 2023 to 2032, an average of 474 thousand adults a year will gain EDS for life in this way. However, those that do not are expected to be both harder to reach and harder to train. To minimise the number of adults without basic digital skills in the UK to only 750 thousand by 2032, 508 thousand will require external assistance to gain these digital skills each year, with associated benefits experienced across a variety of sectors in the UK economy and to a range of economic actors.

In total, we estimate that the benefits to the UK government will sum to £2,737 million. This is derived from savings to the NHS, savings from increased efficiency in the provision of transactional services, and an increase in government revenues. The monetary values associated with these three streams are £899 million, £1,355 million and £483 million respectively.

Benefits to individuals gaining digital skills sum to £8,151 million. This figure is formed from the time savings, retail transaction, earnings and employment benefits streams, each generating a monetary value of £3,906 million, £3,480 million, £586 million and £179 million respectively.

Corporations are also expected to gain from achieving a digitally included society, as the number of vacancies related to digital skills falls substantially. The value to corporations from filling these vacancies as a direct result of 508 thousand adults receiving digital skills assistance annually from 2023 to 2032 is **estimated at £2,719 million.**

In this iteration of the report, we have estimated the benefit to society from a reduction in CO2 emissions of those who receive digital skills assistance. **The monetary value of this figure is estimated at £76 million.**

In total, benefits to the economy sum to £13,683 million, as presented in Table 6. With costs of investing in the 508 thousand people per annum who require support to achieve EDS for life reaching £1,443 million, this returns a **net present value of £12.2 billion.**

This value of benefits generated through all streams calculated using data on the economic status of learners has declined substantially compared with the 2018 iteration. This includes the corporate, employment, earnings, government revenue and environmental streams, although the environmental stream was not included in the 2018 analyses. This decline is largely due to the shift in the demographic makeup of those who require external assistance to gain basic digital skills.

The source data from the Lloyds Essential Digital Skills survey used to estimate the base number of people without digital skills at the beginning of the appraisal period plays a big part in this shift. It shows a decrease in the share of people aged 75+ with digital skills for life from 30% in 2019 to 26% in 2021, hence increasing the number of people in this age category without digital skills at the beginning of the appraisal period and as a result the total number aged 75 and over that will need to gain digital skills by 2032. This effect is compounded by the findings from the ONS internet usage data which shows that, while the percentage of all demographics that use the internet regularly increased over time, the increase is slower for

older generations. Since we use this as a proxy to estimate growth in digital skills acquisition by age group. our projections therefore show older generations gaining digital skills naturally at a much slower pace than others. Consequently, the number of economically active learners has fallen significantly from the previous report, as we estimate this figure using demographic specific assumptions presented in Table 1. The smaller number of learners who are economically active in this iteration in comparison to the 2018 refresh, has had the effect of lowering the monetary benefits derived through streams related to the economic status of learners, as these benefits are now calculated over a smaller base. In addition, the 2018 iteration included an assumption that a certain portion of those who are economically inactive (not employed or currently searching for work) will gain employment as a result of receiving external assistance to gain digital skills. In this iteration we have removed this assumption, to make the results of this research project even more robust and conservative. This has had the effect of lowering benefits generated through the employment stream even further in comparison to the 2018 study.

7. Conclusion

In this report we have detailed a number of ways in which increased digital skills have the potential to yield benefits to individuals, corporations and Government. We estimate a total benefit of almost £9.48 for every £1 invested in training persons to become more digitally able.

This represents a lower benefit cost ratio when compared to the 2018 report. The primary driver of this has been an increase in the proportion of those aged 75 and over in the group of persons that require external support to attain basic digital skills. This has affected the monetary value of benefits derived through the corporate, earnings, employment, and government revenue streams in particular, as benefits from these streams are generated from those who are economically active. The demographic shift has also had the effect of increasing the average per person cost of all learners, as costs are varied by the age of learners, as presented in Table 2 on page 31.

The shift towards older demographics requiring digital skills support in this iteration has had the effect of significantly lowering the number of those who require training and are economically active. In addition, the overall number of people who require additional assistance to gain basic digital skills over the entire ten-year appraisal period has fallen from, 6.9 million in the 2018 report to 5.1 million in this refresh. This difference reflects changes that have occurred over the last four years, affecting the natural level of digital skills present in the UK. Notably, the COVID-19 pandemic had the effect of significantly reducing the number of young people without EDS for life. Although this was not the case for all demographics with the number of people aged 75 and over without EDS for life rising from 2019 to 2021. Although the total number of UK adults without digital skills has fallen from the previous iteration of this report (from 11.3 million in 2018, to an estimated 10.6 in 2022) the pandemic years are expected to have widened the gap between those most likely and least likely to become digitally included organically. The UK workforce is now much more inclined to embrace the flexibilities brought about from increased home and hybrid working. To take advantage of an increasingly digitised work environment, people need essential digital skills for life. However, it is not just workers who can benefit from the closing of the digital skills gap.

As increased digital skills allow people to find the best deals online, save time interacting with banks and government, and work more flexibly, their newfound skills allow them to make monetary savings as well as time savings. Moreover, there are benefits to be had as flexible working generates environmental benefits due to less commuter traffic and associated vehicle emissions. This means that enhanced digital skills also have a role to play in achieving societies goals of CO2 emissions reduction.

These benefits cannot be expected to happen without significant investment from across all parts of society. The encouraging message is that the value of money of such investment remains very high, however the benefits are not only monetary. Increased digital skills also play an important role in ensuring that people do not become marginalised in an ever more digital world, where roles and tasks are becoming increasingly automated. Closing the digital divide has the potential to create considerable progress towards achieving a more cohesive UK, one in which there is a more equal distribution of opportunities throughout society.