The economic impact of Digital Inclusion in the UK

A report for Good Things Foundation

September 2018

Cebr

Authorship and acknowledgements

This report was produced by the Cebr, an independent economics and business research consultancy established in 1992. The views expressed herein are those of the authors only and are based upon independent research by them.

This report does not necessarily reflect the views of Good Things Foundation.

London, September 2018

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Foreword

Sometimes it can be hard to see the digital wood for the digital trees. As our high-streets and our public services are transformed by digitisation - often positively - there's a danger that we forget about those who are either not ready, or not able, to realise the benefits it can provide. Digital technology has the potential to change the lives of many of us. With one click, you can buy almost anything and get it delivered to your door. You can check your bank balance and pay your council tax. One click renews your passport or books your flights. And one click can sort your tax and check your eligibility for benefits. But for many people - 11.3 million at the most recent count - one click feels a million miles away.

Digital technology has given most of us more choices, made life more convenient, and opened up new worlds. But as this report highlights, too many people are excluded, shut out from these benefits and actively disadvantaged. In a decade's time, seven million British adults will still be digitally excluded. These people will be at risk of falling further and further behind. They won't be able to enjoy the benefits of convenience, choice and opportunity that digital brings.

Today in the UK, there are over eleven million people who lack the basic digital skills they need to participate fully in our digital economy. There is a clear digital divide in our nation, which is harming those who are left behind and holding our economy back. By 2028, we'll be missing out on almost £22 billion of value as a direct result of digital exclusion. This is something we all have a stake in.

At Good Things Foundation we commissioned this research because we wanted to understand both the scale of the challenge and what can be done to do to end it. The problem is a real and significant one - if nothing changes then more than 10% of British people will still be digitally excluded by 2028. But we know that by working together we can bridge the digital divide so that we all benefit from digital.

Up and down the country, local partners in our Online Centres Network work in their communities to support people to become digitally included. They work with a range of people - older people, recent immigrants, those looking for work - all of them at risk of being left behind as technology advances. Our centres include libraries, community centres and village halls, and they deliver support tailored to the needs of the people living in their communities. They help people to use digital in order to find a job, sort out their benefits, learn about the things that interest them, or simply to connect with friends, new and old. Not only does the Online Centres Network help people to become digitally included, but people are supported to become socially included too - connecting with their communities, and overcoming the social challenges they face.

If we are to avoid the growing digital divide holding both individuals and our economy back, we need to do more. We know Government understands the need for action - I am pleased, for example, that Good Things Foundation is playing a key role in both national and local Digital Skills Partnerships to map and address skills needs and shortages. We also work with many other organisations in the corporate world to deliver positive programmes that change lives, thanks to the Online Centres Network.

As the pace of digitisation increases, bringing benefits for some but leaving others behind, we need to be investing today to avoid disadvantaging more people in the future.

That's why, on the back of the research contained in this report, we're campaigning for a commitment to reaching a 100% digitally included nation. Working with partners across government and business, we're asking everyone to do more to close this digital divide, once and for all.

We want to ask those with a stake in digital inclusion - and also those who have the most to benefit - to make a commitment to supporting everyone in the UK become digitally included by 2028. We can only do this by working together.

At Good Things, we're always pragmatists and never pessimists. We know digital technology can't be held back. But we don't accept that digitally excluded people are simply unfortunate collateral damage in the pursuit of progress. We're calling on everyone to play their role in helping us to reach this ambitious - but achievable - goal.

Over the coming months, we'll work with other organisations and champions - as well as with our network - to highlight the findings of this report and to turn its conclusions into reality.

A digital divide exists in the UK, which is hurting people and our economy - and the gap between those who are included and those who aren't is getting worse. But we can fix it and - working together - I believe we will.

Helen Milner
Chief Executive, Good Things Foundation

Executive Summary

- This report is an update of Cebr's 2015 study on the economic impact of Basic Digital Skills and inclusion in the UK. As before, the purpose of this research is to establish the likely investment required in order to achieve a fully digitally included society and to estimate the benefits that will result, for individuals, government and society as a result of the initiative.

- This report is based on data measuring Basic Digital Skills from the Lloyds Consumer Digital Index. The Basic Digital Skills framework was replaced in 2018 with the Essential Digital Skills framework, with the two frameworks correlating closely. The report should therefore remain a useful resource when measuring the impact of Essential Digital Skills.

- Three years later, this issue is even more relevant. The most recent Lloyds Bank UK Consumer Digital Index report estimated that 21% of the UK population lacks at least one Basic Digital Skill, equivalent to **11.3 million adults in the UK not being digitally included**. While this figure is below the 12.6 million observed in 2015, the digitally excluded part of society is still numerically significant.

- Our results suggest that **6.9 million people will remain digitally excluded by 2028**.

Benefits of supporting Basic Digital Skills development

- **Ensuring that all UK adults learn Basic Digital Skills will benefit not only the individuals who develop these skills, but also the economy as a whole.** Individuals can take advantage of digital skills to complete their daily tasks more efficiently, while also being more productive at work and hence be compensated with higher salaries. This learning process opens the door for new job opportunities and can even improve the chances of unemployed people or inactive people finding more suitable roles. Employers benefit from the productivity boost while government may see tax revenues rising. Additionally, as more people are able to make use of online government services, the burden on certain public service such as the NHS also declines.

- We carried out an analysis to calculate the cumulative benefits of supporting individuals without digital skills to learn Basic Digital Skills by 2028. **Given the variety of benefits associated with having a digitally included population, we focused on eight channels**: time savings to the individuals, increased individual earnings, enhanced employability, online retail transactions benefits, improved social inclusion, the supply of more efficient health services, greater digitisation of government transactions, and reduction in digital skills shortages vacancies. These channels are considered to be the eight most likely channels through which the benefits will accrue to individuals and the economy on a gross basis.

- **Time savings:** Undertaking financial and government transactions online can bring about considerable time savings when compared to having to visit a bank branch, or local council office. We estimate the value of time saved by 2028 to be £1.1 billion.

- **Earnings benefit:** Learning Basic Digital Skills is expected to increase the incomes of individuals, as they become more productive and are able to get into roles that are more skill intensive. The earnings benefit also takes into account the rise in employer and employee NICs, and income tax receipts that the government gains, from individuals with higher incomes. By 2028, we estimate the total earnings benefit to the economy to equate to £571 million.

- **Employment benefits:** Basic Digital Skills support can increase the likelihood of unemployed, or economically inactive individuals, to enter the workforce. The move into employment will boost individual incomes and, as a result, increase employee and employer' NICs, as well as income tax

receipts to the government. We estimate the total employability benefits to amount to £313 million by 2028.

- **Transaction benefits:** Learning digital skills gives individuals the opportunity to shop online, allowing for considerable cost savings. We estimate the cost savings that can be made by individuals from using cashback and discount websites to amount to £1.1 billion by 2028.

- **Communication benefits:** Digital skills inclusion implies that individuals can use online tools to keep in touch with their friends, family and local community, thereby feeling more connected. We assume that the reduction in social isolation will lead individuals to allocate a higher share of their disposable income to recreational and culture activities. We estimate the aggregate additional expenditure on recreational and cultural activities to amount to £400 million by 2028.

- **NHS savings:** Individuals who have learnt Basic Digital Skills can take advantage of the NHS Choices website, E-prescriptions and online bookings systems. This will lead to a reduction in the number of avoidable GP visits, as well as a reduction in the costs of providing offline booking services. We estimate the cost savings to the NHS to total £141 million by 2028.

- **Digital efficiency savings:** Supporting the development of a digitally included population can foster the growth in the use of online government services. This will lead to a reduction in the use of offline services which are more costly to the government to provide. We estimate the boost in savings to the government associated with an increase in digital take-up to reach £487 million by 2028.

- **Corporate benefits:** Digital inclusion can help companies to fill their digital skills shortages vacancies. This will lead to productivity gains for firms that see their output increase once their staff are fully proficient. We estimate the corporate benefits from a reduction in digital skills shortages vacancies to be £1.5 billion by 2028.

Investment required to have a digitally included population

- To obtain a comprehensive view of any policy we need to consider the costs associated with its implementation. Supporting the learning process of an estimated **694,000 number of people each year** will require a substantial financial commitment.

- To establish the operational and capital costs attributable to each learner we relied on data from Good Things Foundation on the practical and attributable costs of setting up and operating a basic skills training centre. The costs of training an individual also take into account the intensity of the learning process. These **tuition costs vary from £42 to £380 per learner depending on the age of the learner, their disability status, and previous digital skills level**. We estimate that an **investment commitment with a present value of £1.2 billion** (see Total column in Table 1) **is required over the ten year period** in order to support the development of a digitally included population.

- On top of these costs, to be able to take full advantage of the newly learnt digital skills, people will need to have access to internet-enabled digital devices such as laptop computers, tablets and smartphones. Given that smartphones are a low cost way of accessing the internet, especially when compared to laptop computers and tablets, we assumed that the price of a smartphone is the minimum cost an individual will have to take on to be digitally included. Based on the likely trajectory of the price of smartphones and the projected smartphone ownership rate in households where individuals are somewhat digitally excluded, we estimate that **the costs to individuals from purchasing internet enabled devices has a present value of approximately £373 million over the ten year period** (see Total columns in Table 1).

- Combining the two sources of costs above leaves the **total present value of the required investment at £1.59 billion** (2017 prices) over the ten year period.

Comparing costs and benefits

- In order to determine whether investing in a digitally included society represents a sound investment, it is necessary to use appropriate economic appraisal metrics such as Net Present Value (NPV) and Cost-Benefit Ratio.
- When all costs and benefits to individuals, businesses and the Government are taken into account, **we estimate the NPV for the 10 year investment to be £21.9 billion (**Table 1) **and the CBR to be 14.8**. **This implies a benefit of almost £15 for every £1 invested.**

Conclusions

- The evidence backs the view that supporting digital inclusion brings substantial gains for individuals and for society as a whole. **The boost in tax receipts and NHS savings alone exceeds the size of the investment required.**
- A report from the House of Commons Science and Technology Committee estimates that the digital skills gap is costing the UK economy £63 billion a year in the lost potential for additional GDP[1]. **Supporting the digital inclusion of the UK population by ensuring that all adults learn Basic Digital Skills could help erase this cost.**
- The boost in social inclusion that can arise from this investment is especially relevant in today's society. **An increasing number of daily tasks or job responsibilities require digital skills and those that haven't learnt Basic Digital Skills can end up being socially marginalised.** Assisting individuals who lack digital skills throughout their learning process can help to mitigate these marginalisation trends.

Table 1: Summary[2] of the cost and benefits of the proposed investment programme, £ million (2017 prices)

		Year 1	Year 10	Total (present value)
		2019	2028	
		£m	£m	£m
Investment costs	Operating cost	-142	-142	-1,178
	Investment cost	-5	-5	-39
User costs	User cost of digital devices	-69	-26	-373
User benefits	Net earnings benefits	34	343	1,485
	Net employment benefits	21	228	960
	Transaction benefits	106	1,063	4,614
	Communication benefits	40	400	1,736
	Time savings	99	1,053	4,459
Gov. benefits	NHS cost savings	14	141	610
	Income tax and NI receipts	30	313	1,350
Gov. and user benefits	Digital efficiency savings	49	487	2,114
Corporate benefits	Reduction in digital skills shortages vacancies	109	1,479	6,141
	Discount factor @ 3.5%	0.97	0.71	
	Present value	172	2,883	21,879

Source: Cebr analysis

[1] https://publications.parliament.uk/pa/cm201617/cmselect/cmsctech/270/270.pdf

[2] Please find the complete table of results on page 49 of this report.

1 Introduction and background

This is a report by the Centre for Economics and Business Research (Cebr), on behalf of Good Things Foundation, on the costs and associated benefits of ensuring that all UK adults learn Basic Digital Skills. The report is a refresh of a 2015 study[3]. Similar to what was done initially, the purpose of this research is to establish the likely investment required in order to achieve a fully digitally included society and to estimate the benefits that will go to individuals and society as a result of this initiative.

Three years later, this issue has become even more relevant. The 2018 Lloyds Bank UK Consumer Digital Index report[4] estimates that 21% of the UK population lacks at least one Basic Digital Skill. This is equivalent to 11.3 million adults not being digitally included. While this figure falls below the 12.6 million observed in 2015, the digitally excluded section of society is still considerable. This group is missing out on a wide range of benefits. In the digital age, being able to use digital technology is quickly becoming an essential skill and those that are not equipped are becoming increasingly marginalised in society and in employment. For instance, within 20 years 90% of all jobs are expected to require some element of digital skills[5].

Supporting the development of digital skills is therefore essential to ensure the workforce is prepared for the rapid development of technologies and the advent of digitisation. This is a challenge that is recognised not only in the UK, but also internationally:

- In 2017, the Government published the UK Digital Strategy. It consists of seven strands, the second of which focuses on digital skills and inclusion. The message is clear; to have a digitally-driven inclusive economy we need to ensure that everyone has the digital skills to flourish[6]. As part of this initiative, the UK government established a new Digital Skills Partnership (DSP) to help people access the skills they need to succeed in a digitally-focused world.

- In order to understand the new trends shaping the world of work, the International Labour Organisation (ILO) launched the 'Future of Work Initiative'. In 2017, the ILO set up an independent Global Commission to deliver an analytical assessment of the key challenges facing the world of work, as well as to produce a set of recommendations based on this analysis. The key goals of the Global Commission's research are to guide ILO's actions and orient national policies on the future of work. There are six thematic clusters; these focus on the main issues that need to be considered if the future of work is to be one that provides security, equality and prosperity. Particularly, the ILO recognises that new types of jobs and employment are changing the nature and conditions of work by altering skill requirements. As a result, the ILO included in the six clusters, 'The impact of technology on the quality and quantity of jobs' and 'Skills policies and systems for a future workforce'.

The dramatic advancement of the internet and digital communication technologies in the workplace have accelerated the need for a 100% digitally included population. As a result, it is essential to have a clear picture on the benefits of investing in a digitally included society, and whether such investment can justify the associated costs. After analysing the costs and benefits of achieving a digitally included society, we are

[3] https://www.goodthingsfoundation.org/sites/default/files/the_economic_impact_of_digital_skills_and_inclusion_in_the_uk_final_v2_0.pdf

[4] https://www.lloydsbank.com/banking-with-us/whats-happening/consumer-digital-index.asp

[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/499031/Review_of_Publicly_Funded_Digital_Skills_Qualifications_2016_FINAL.pdf

[6] https://www.gov.uk/government/publications/uk-digital-strategy/executive-summary

then able to make practical recommendations on how to address the digital skills gap in the context of the future of work agenda.

1.1 What are Basic Digital Skills?

Doteveryone and its partners[7] define Basic Digital Skills as the minimum skills required for an individual to safely use the internet and access the benefits it has to offer. An individual with Basic Digital Skills is expected to have the capabilities to undertake the following tasks:

- **Managing information**: having the skills to use a search engine to find information, search for deals on comparison websites, able to bookmark useful websites and services and store data on a device or in the cloud.

- **Communicating**: the individual is able to keep in touch with family and friends using emails, instant messaging, video calls and social media. This includes the ability for an individual to post comments on forums, connect with online communities and leave feedback e.g. on shopping websites and for service providers about purchases or experiences they've had.

- **Transacting:** the ability to undertake financial transactions, such as completing a Universal Credit application, ordering shopping, booking travel, managing bank accounts, using digital government services and understanding how to buy and sell on the virtual marketplace.

- **Problem-solving:** The individual should be confident to solve problems using digital skills such as teaching themselves simple tasks using video lessons, using feedback from other internet users to solve a common problem and accessing support services e.g. 'live chat'.

- **Creating:** having the skills to create basic digital content. For example, creating a social media post, drafting a text document, creating and sharing photo albums and providing feedback to online communities.

An individual who can successfully undertake the above tasks is considered to have Basic Digital Skills. Our view is that by supporting this learning process we can achieve a more digitally included society.

This report is based on data measuring Basic Digital Skills from the Lloyds Consumer Digital Index. The Basic Digital Skills framework was replaced in 2018 with the Essential Digital Skills framework, with the two frameworks correlating closely. The report should therefore remain a useful resource when measuring the impact of Essential Digital Skills[8].

1.2 Digital Skills – the present situation

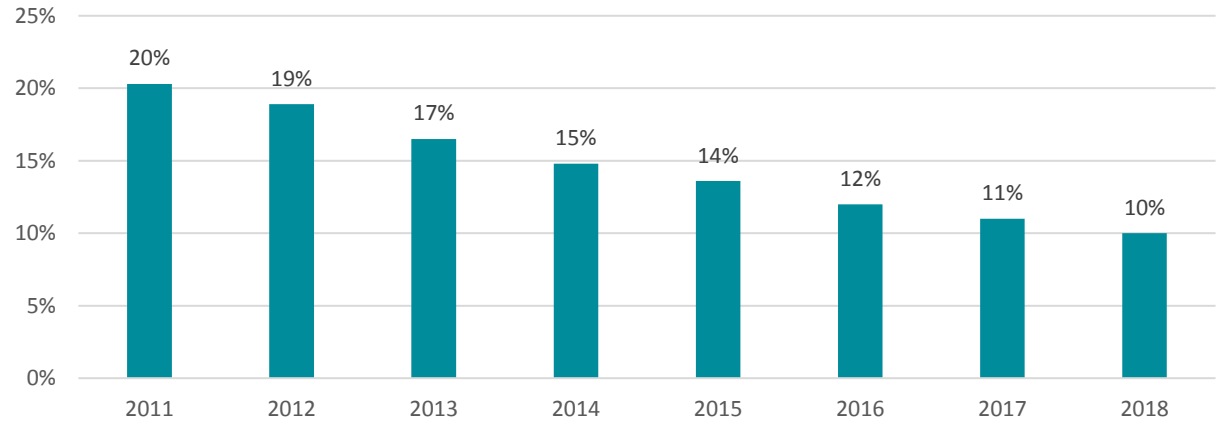
For the majority of the UK adult population, using the internet is part of daily life. However, the ability to do so is not a universal skill. Figure 1 below shows the percentage of lapsed and non-internet users in the UK between 2011 and 2018. The proportion of the UK adult population which has never used the internet or are infrequent users is clearly on a downward path. While the rate of decrease has decelerated over

[7] This definition was developed by Doteveryone in collaboration with the London School of Economics (LSE), Citizens Online, the London Business School and Good Things Foundation.

[8] The Lloyds Banking Group and the Tech Partnership define Essential Digital Skills as the minimum skills required for an individual to benefit from, participate in and contribute to the digital world of today and the future. For more detail, please see: https://www.thetechpartnership.com/wp-content/uploads/2018/05/EssentialDigitalSkillsFramework-29May18.pdf

the years, in 2018 only 10% of the UK adult population had never used internet or were infrequent users, compared to 20% in 2011.

Figure 1: Percentage of lapsed and non-internet users in the UK (persons aged 16 and over)



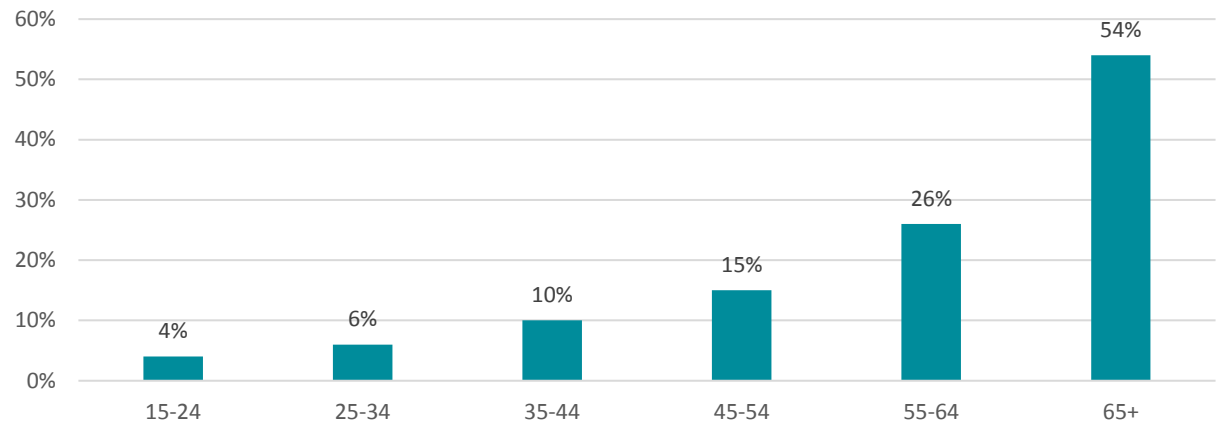
Source: ONS

The ability to use the internet is an important component of Basic Digital Skills. This suggests that over time, the number of people without digital skills will follow a similar path to the one observed above, as individuals autonomously develop Basic Digital Skills.

The Lloyds Bank Consumer Digital Index (CDI) is the largest measure of the digital literacy of people in the UK. Over the past three years, Ipsos MORI was commissioned to carry out a survey on the extent of digital skills amongst the UK population. According to the latest edition, 21% of the UK adult population in 2018 lacks Basic Digital Skills – this equates to 11.3 million adults.

The third edition of the CDI reveals a large intergenerational digital divide. The proportion without digital skills is highest in older age groups, as 54% of the UK population aged 65 and over do not have all five digital skills. In contrast, 96% of 15-24 year olds have all five Basic Digital Skills. An obvious explanation for this is that younger generations have grown up with digital technology. By contrast, older generations without digital skills may have had limited interaction with digital technology during their working lives, and have therefore not had the opportunity to acquire these skills. In a highly digitized world, this contributes to the marginalisation of the older population.

Figure 2: Proportion of population without Basic Digital Skills, by age group

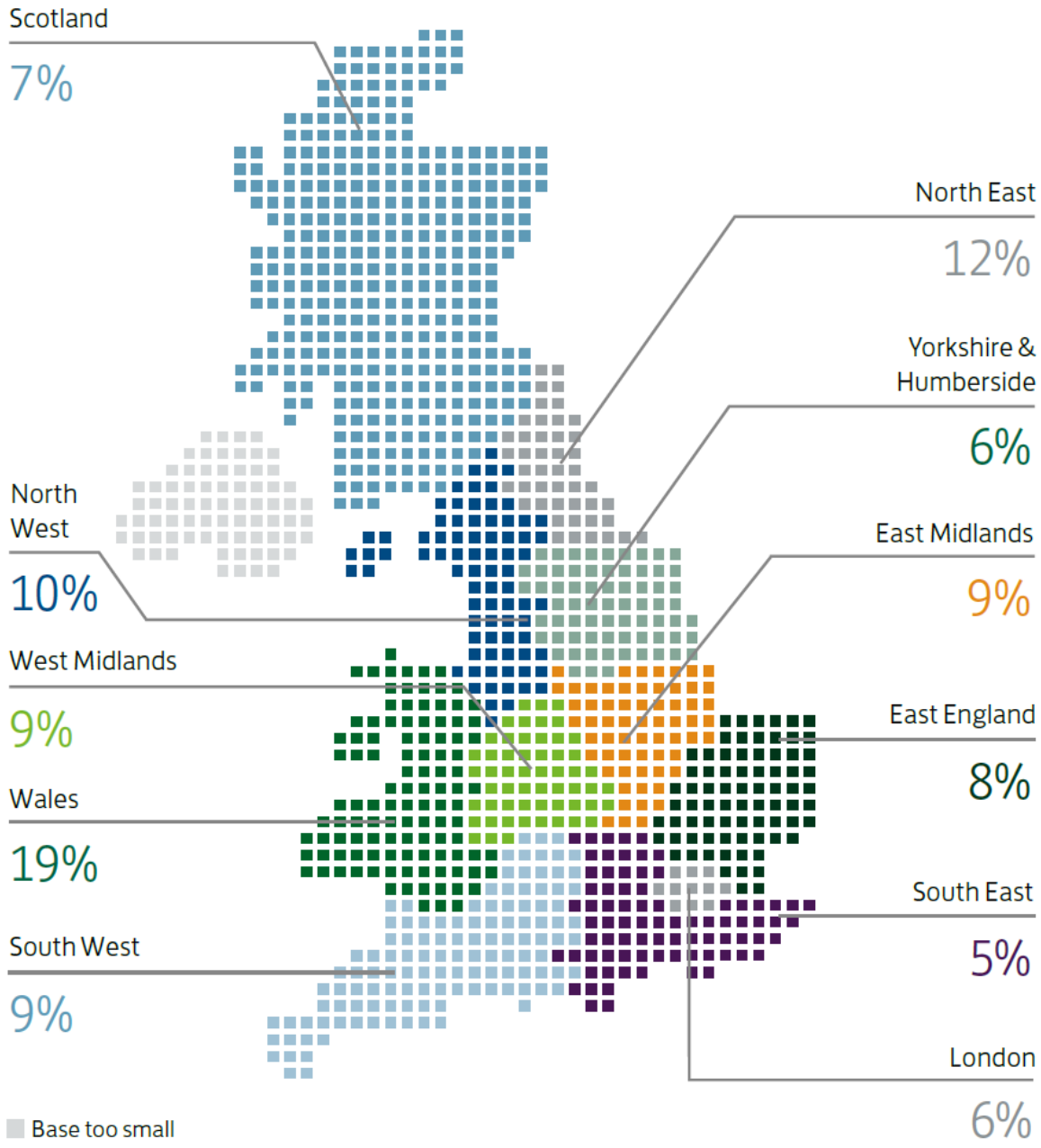


Source: Lloyds Bank *CDI 2018*

Figure 3 (from the CDI 2018 report) illustrates the variation in the level of Basic Digital Skills across regions in the UK. There is substantial variance across these regions: the proportion of individuals without Basic Digital Skills is highest in Wales (19%) and the North East (12%), respectively. By contrast, in London just 6% of the population do not have all five Basic Digital Skills.

This substantial variation across UK regions is something that the Digital Skills Partnership seeks to address. By asking LEPs and other local organisations to establish Local Digital Skills Partnerships, the UK government is hoping to address the fragmented nature of the digital skills landscape. An initiative at the local level is more likely to be successful at identifying the digital skills gaps across regions and then developing a more tailored set of courses and programmes to tackle digital exclusion across regions.

Figure 3: Proportion of population without Basic Digital Skills, by nation/region

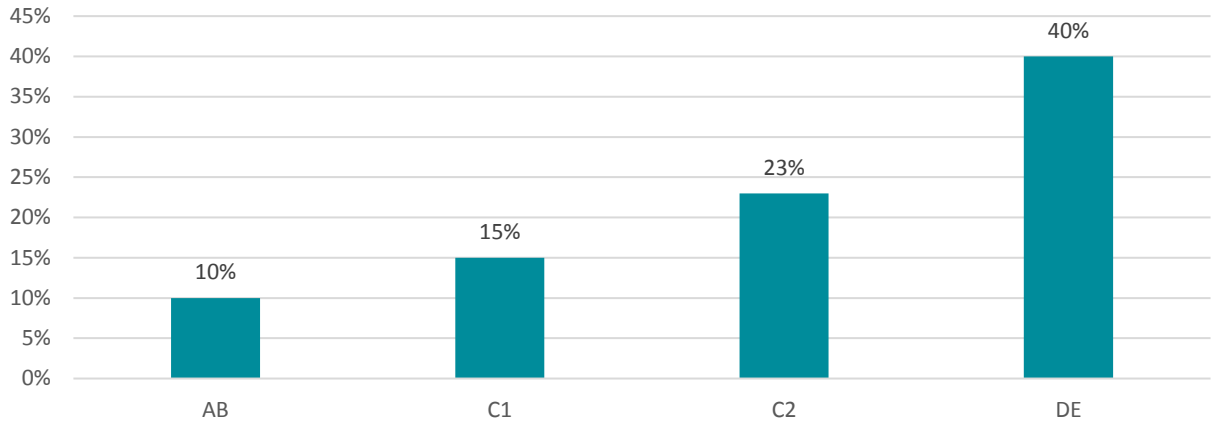


Source: Lloyds Bank *CDI 2018 report*

Figure 4 below shows the proportion of population without Basic Digital Skills by social grade. Similarly to the 2015 study, the figure below indicates that having Basic Digital Skills tends to correlate with higher skilled occupations; manual skilled, semi-skilled and unskilled occupations (social grade DE[9]) have the highest concentration of people without digital skills - three times as high as the AB social grade.

[9] The social grade classifications relate to standard occupation groups as follows: A: Higher managerial, administrative or professional occupations, B: Intermediate managerial, administrative or professional occupations, C1: Supervisory or clerical and

Figure 4: Proportion of population without Basic Digital Skills, by social grade



Source: CDI 2018 report

The chart above reinforces the importance of providing digital skills support to low skilled and unemployed workers in terms of improving their chances to move up the employment ladder. Furthermore, the evidence above suggests that the digitally excluded tend to be concentrated in the most vulnerable groups of the UK population. Therefore, a digitally included society can mitigate the levels of marginalisation currently being experienced.

This is especially relevant in the context of the latest developments within the world of work. For instance, according to Tech City UK research, between 2011 and 2015, the number of highly skilled and highly paid digital jobs grew at twice the rate of the number of non-digital jobs[10]. As the number of job opportunities for non-digitally skilled people falls, the lifetime earnings of these roles are also expected to decrease relative to the lifetime earnings of highly skilled roles, propagating the divide across individuals.

1.3 Purpose and objectives of this study

Similarly to the first edition of Cebr's report, the objective of this study is to examine the costs and benefits to society of a scenario where investment takes place to support the development of a digitally included population in the UK over the next ten years (by 2028).

Cebr still stands by the goal of equipping 100% of the UK population with Basic Digital Skills. According to an EU-wide survey of internet usage by individuals[11], the proportion of individuals who have never used the internet is close to 0% in several countries, with more countries than ever approaching the 0% bound. Iceland (1%), Norway (1%), Denmark (2%), Sweden (2%), Luxembourg (2%), and the Netherlands (3%) are ahead of the UK (4%) in terms of internet usage amongst the population. Their success suggests the UK could achieve similar performance levels.[12].

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junior managerial, administrative or professional occupations, C2: Skilled manual occupations, D semi-skilled and unskilled manual occupations, E: casual workers, non-working and pensioners

[10] https://digitalskillspartnership.blog.gov.uk/2018/02/19/the-local-dsps-delivery-group/

[11] Eurostat, 2017, 'Survey on ICT (information and communication technology) usage in households and by individuals'.

[12] However, it is acknowledged that even if a digital skills investment programme of this scale was introduced and implemented, in practice it is likely that there would still remain a small proportion of the population that would opt out of digital skills training or be unable to attend. Therefore, the calculations presented in this study should be interpreted as the hypothetical outcomes related to a scenario that may materialise somewhat differently in practice.

The importance of achieving the 100% target is even more relevant today. The pace of digitisation in the workplace is not losing steam: within 20 years 90% of all jobs are expected to require some element of digital skills[13]. The UK government has recognized the importance of supporting the development of digital skills to build a digitally inclusive society which is able to face the challenges brought about by digitisation and automation in the workplace. It was in this context that the Digital Skills strategy was launched last year and the Digital Skills Partnership Board was established.

Similarly, ILO's future of work initiative includes an overview of the skill requirements for the future of work and considers how skill development systems might be transformed to meet these needs. One of the most important takeaways from the future of work agenda is on the implications of digitisation for the ageing population. As life expectancy increases and birth rates stagnate in developed countries, workers need to remain longer in the workforce. To be able to have the skills required to stay for longer in the workforce, workers will need to constantly upgrade their digital and technology-related skills. Additionally, the rise of e-learning implies that digitisation can also facilitate access to skills and learning opportunities in general. However, if individuals in older age groups do not have Basic Digital Skills, they will not be able to keep up with the changing workplace demands, nor will they be able reap the benefits offered by digitisation in terms of learning opportunities.

It is within this context that Good Things Foundation decided to commission Cebr to refresh the 2015 study. The purpose of this year's update is therefore to recalculate the economic value of digital inclusion, compare these benefits to the costs involved in supporting individuals developing Basic Digital Skills and provide a robust estimate of the net present value and cost-benefit ratio that such an investment would deliver for the UK economy. Cebr's contribution to the discourse around the future of work and the impact of digitisation includes:

- Provision of a detailed estimate of the number of people that would need digital skills training in order to have a digitally inclusive society by 2028, based on a comprehensive nationally-representative survey;
- A different approach of estimating the investment required over a ten year period to support the digital skills learning process. The information required to calculate these costs is sourced from a number of existing digital skills centres and includes the capital cost involved in the setup and operation of centres;
- Calculating and consolidating the various benefits that have been cited in previous studies, and attributing those benefits to the groups to which they would accrue;
- Cost-benefit analysis to assess whether the proposed investment to support digital inclusion is worthwhile from the perspective of society and government, involving the monetisation of as many of the costs and benefits of the proposed investment that it was feasible to achieve.

1.4 Limitations of the study

This year's study faces similar limitations to the ones discussed in the 2015 report. These are summarised here:

13 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/499031/Review_of_Publicly_Funded_Digital_Skills_Qualifications_2016_FINAL.pdf

- ***The funding sources of any potential Basic Digital Skills programme****: currently, centres providing Basic Digital Skills training receive funding from a variety of sources, with the majority coming from Government departments. A future digital skills training programme would require substantial financial support. The potential source of this funding is beyond the scope of this study.*

- ***The appraisal period:*** *the time period for which the costs and benefits are calculated – is restricted to 10 years. In practice, the benefits associated with gaining Basic Digital Skills will accrue to the learner well beyond this ten year period. However, given that the population requiring digital skills training is heavily concentrated in older age groups, it is prudent and conservative to restrict the measurement of benefits to the period of the investment programme.*

- ***Benefits to businesses:*** *we only consider the wider benefits to businesses of employees gaining Basic Digital Skills in terms of a reduction in skills shortages vacancies. Although we capture the potential increase in employees' productivity through their boost in earnings, we do not go so far as to examine what this means for businesses, in terms of revenue, costs, investment and innovation. Rather, we have focused on the sources of benefit that have the greatest potential.*

1.5 Structure of the report

This report is structured as follows:

- **Section 2: The increasing importance of digital inclusion** - Sets out the importance of investing in digital inclusion in the context of recent developments in the UK economy.

- **Section 3: Investment required to have a digitally included population** – Presents estimates on the number of people that will require support to reach the objective of 100% of the UK adult population having learnt Basic Digital Skills by 2028 and estimates on the overall investment required.

- **Section 4: The economic benefits of supporting digital inclusion to the UK economy** – Presents the estimated monetised benefits of ensuring that all UK adults learn Basic Digital Skills to individuals and society.

- **Section 5: Comparing the costs and benefits of supporting digital inclusion** – Compares the overall costs and benefits in monetary terms adjusted for the time value of money, in order to determine whether the benefits related to ensuring that all UK adults learn Basic Digital Skills justify the investment.

- **Section 6: Conclusions** – Presents the conclusions on the findings of the research.

2 The increasing importance of digital inclusion

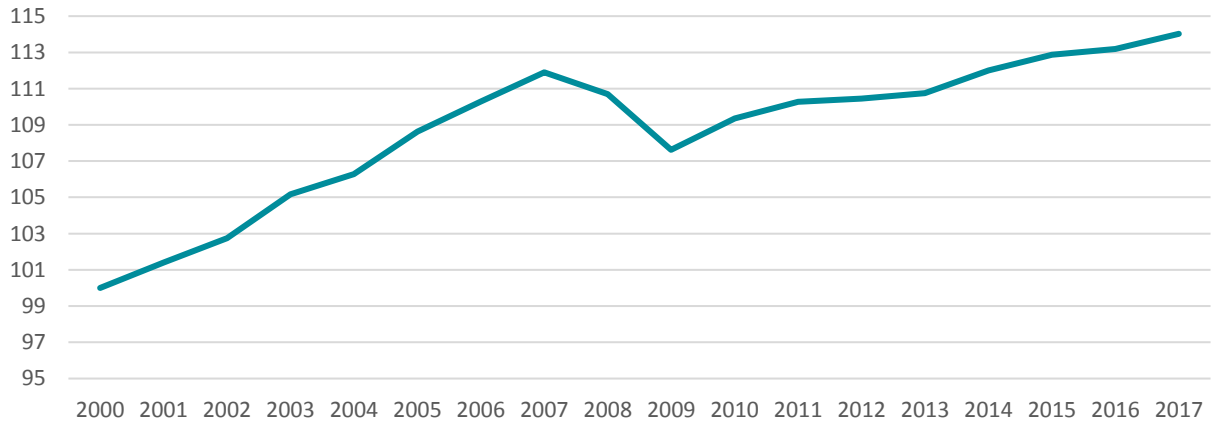
This section outlines the importance of having a digitally included population for the UK economy. We structured this section as follows:

- 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 potential cost and efficiency savings government stands to gain from providing access to public services through the internet.

2.1 Productivity

Supporting the development of a digitally included society is especially relevant in the context of the UK's productivity puzzle. As seen in Figure 5, after the financial crisis, productivity fell considerably and remained below its pre-crisis peak for a number of years. For instance, in the third quarter of 2012, non-oil output per hour and output per worker were approximately 15% below their pre-crisis trend level[14].

Figure 5: UK labour productivity (GVA[15] per employee) from 2000 to 2017 (index 2000=100)



Source: ONS, Cebr analysis

While labour productivity[16] has recently recovered to its pre-crisis levels, when compared to its peers, the UK is still lagging behind in terms of productivity growth. As a result, the challenge to boost UK productivity growth remains in the hot seat. Over three quarters of the UK economy is service based and Basic Digital Skills are intrinsic to the majority of roles in these sectors. The UK needs to maintain strong productivity growth in order to remain competitive in the international marketplace and to achieve economic growth.

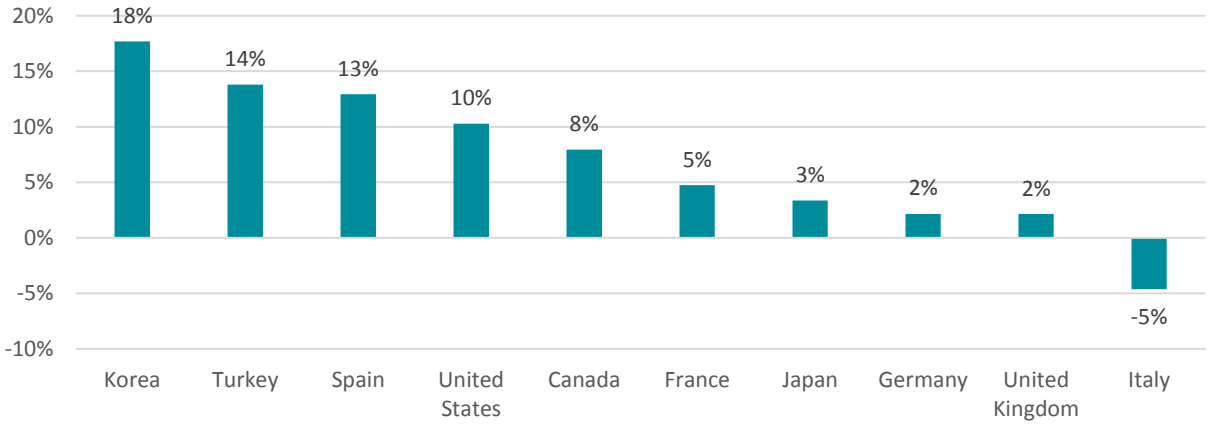
[14] http://obr.uk/box/the-productivity-puzzle/

[15] 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.

[16] Labour productivity, defined as the average value added per worker, is calculated as the total UK Gross Value Added (GVA) divided by the total number of individuals in employment in the same year.

Currently, the UK ranks 9th out of the 10 largest OECD economies in terms of productivity growth since 2008, as seen in Figure 6.

Figure 6: Productivity growth (GDP per person employed) between Q1 2008 and Q4 2017, 10 largest OECD economies



Source: OECD, Cebr calculations

According to a study by the Centre for Education and Economics[17], the average wage premium associated with having digital skills is between 3% and 10% of annual earnings. The earnings of employees are normally strongly related to their productivity – employers are willing to pay more to people who are more productive, because they stand to benefit from increased output. This implies that ensuring all UK adults learn Basic Digital Skills would have an impact in terms of employability and productivity levels.

2.2 Technological change, automation and the future of work

Technological progress is one of the most important sources of economic growth. However, its benefits are not always evenly spread across the population. For instance, the effect of technological changes on the quantity and quality of jobs has been thoroughly discussed in ILO's future of work agenda. The overall view is that technological change not only destroys and creates jobs, but it also transforms existing jobs.

There is an extensive debate around the potential impacts of this recent technology wave on automation and job destruction. Some studies have estimated the potential magnitude of job destruction to be at worrisome levels. A PWC study suggest that up to 30% of UK jobs could potentially be at high risk of automation by the early 2030s[18]. However, many point out that it is unlikely to see entire occupations being destroyed by automation. A more sensible view is that jobs within occupations will vary. For instance, Arntz, Gregory and Zierahn (2016) find that automation is more likely to replace tasks instead of jobs. They estimate that only 10% of UK jobs are at risk of being automated[19].

Other authors also identify the importance of not forgetting the role of job creation in this narrative. Technological change can trigger (and has triggered) new economic activities, as well as job creation in existing activities. To put it in crude terms, robots need to be built. The demand for robots stimulates the supply chains around its development and production, which then stimulates the demand for new jobs in

[17] 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.

[18] https://www.pwc.co.uk/economic-services/ukeo/pwcukeo-section-4-automation-march-2017-v2.pdf

[19] https://www.oecd-ilibrary.org/docserver/5jlz9h56dvq7-en.pdf?expires=1529408242&id=id&accname=guest&checksum=609E2C87B0B8001DDB84B76BFA3422D5

the sectors in the economy which are linked to these activities. Additionally, technological innovation fosters new innovation waves, which then leads to the creation of new products and potentially new roles in the workplace. Other boosts in the demand for new jobs can be experienced via the effect of technological innovation on the decline of working hours. As people have more leisure time, there is an expected increase in the demand for leisure related activities, which stimulates production and employment in these leisure based sectors.

Irrespective of the exact final effect of technological change, there is a visible trend which translates into having a more digitised workplace. This process involves significant changes and adjustments for workers and companies, which are often costly. However, any potential costs and negative impacts of technological change will be more prominent if workers do not have the necessary skills to adapt to these new tasks and new roles. Similarly, the likelihood of success in the 'automation vs. job destructions/creation' story relies on the ability of the workforce to respond to these challenges, as well as on how well we tackle the associated distributional challenges.

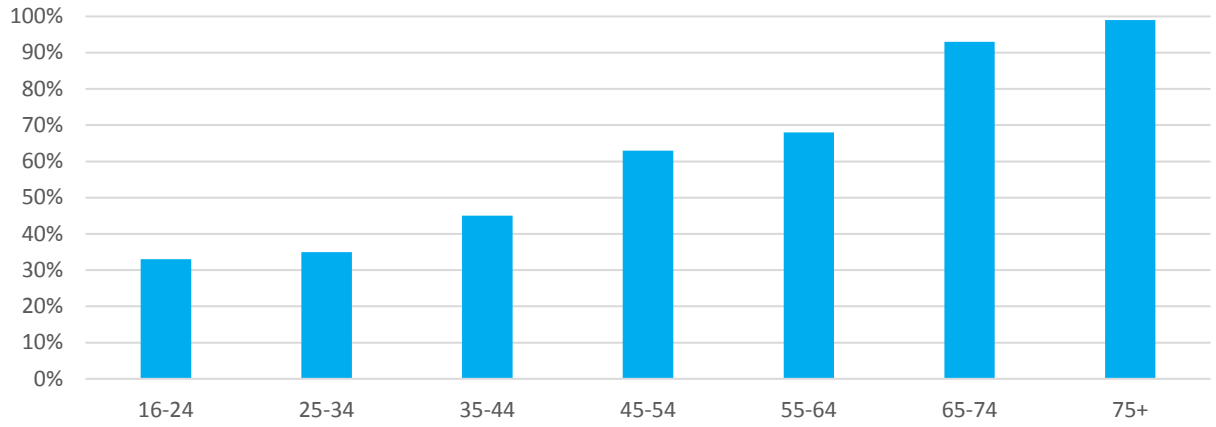
This is well entrenched in the future of work agenda. One of the papers produced by ILO in this context states that: "Experience shows that the outcome of technological changes depends on how these adjustment processes are managed and whether or not they include support for communities and displaced workers (including training and income support) and start-up incentives for firms" [20].

Given the digital nature of the changes we are experiencing, supporting the development of digital skills across the nation is an essential step to smooth out this transition. On the one hand, learning digital skills is a necessary step to prevent the occurrence of marginalised groups of individuals that cannot keep up with digitisation at the workplace. On the other hand, ensuring that individuals foster their digital capabilities will increase their employability by providing workers with the necessary skills to adjust to the new tasks and roles that technological change has created, and will continue to create in the future. Furthermore, it is not unreasonable to expect that a considerable share of the workers at risk of 'technological unemployment' will also be the ones struggling to make use of new technologies to find new jobs; as the internet becomes an increasingly pervasive tool for job hunting and recruitment, the concerns about long term 'technological unemployment' gain a new significance.

In 2017, more than half (55%) of those with access to the internet had never used it to search for job opportunities or to apply for a job online (Figure 7). While this is a sizeable group of the UK adult population, most of it is driven by the considerable share of people over 55 who have never used the internet to search for job opportunities or to apply for a job online. Amongst individuals aged 55 to 64, 68% have never used the internet for job search purposes; this raises to 93% in the age group 65+. We recognise that only a small proportion of this age group is in work or actively looking for work. However, current demographic trends indicate that more people will be working past the age of 65 in the future. As explained in our 2015 report, increased life expectancy, smaller pension pots and larger mortgages mean that it will be necessary for a higher number of older people to continue to work past retirement age. Supporting the learning process of digital skills in the older age groups, particularly skills related to job searching, will help improve the success of those looking for employment and thus their overall prosperity in old age.

[20] http://www.ilo.org/global/topics/future-of-work/WCMS_534201/lang--en/index.htm

Figure 7: Individuals using the internet who have never looked online at job opportunities or applied for a job online search for job opportunities (% of those that use the internet), 2017



Source: Ofcom Adult Media Literacy Tracker 2018

A key message from the debate around the impact of technological change on the future of work is that the UK has to adjust its education and training systems to the digital nature of the skills required. This is an essential step if the UK is to maintain its competitiveness in the digital economy. As mentioned in the introduction of this report, the UK Digital Strategy attempts to set out the way forward to tackle the challenges of this endeavour. Investing in the digital inclusion of the UK population is an essential step to prepare the country for the new tasks and roles brought about by the digitisation of the workplace.

The fast pace of technological change has also raised questions around the relevance of the previous definition of Basic Digital Skills. To address this, the Tech Partnership and Lloyds Banking group launched a consultation to update the framework around Basic Digital Skills[21]. It was in this context that the Essential Digital Skills framework was developed. This is the first update of the Basic Digital Skills Framework since its original publication in 2015. One of the most significant changes was the introduction of distinct skills statements for life and work. This was a necessary step to keep the framework relevant in today's digitised workplace. In a near future, the highly technical digital skills of today will eventually become the Basic Digital Skills of tomorrow. This raises the pressure to quickly equip the UK population with what we define today as Basic Digital Skills.

2.3 Financial savings from online retail

The number of people in the UK who have never used the internet has significantly decreased since ONS started to record data on this indicator. There are currently 4.5 million people in the UK who have never used the internet and 0.9 million that use it occasionally. In 2015, these figures stood at 5.9 million and 1.1 million people, respectively.

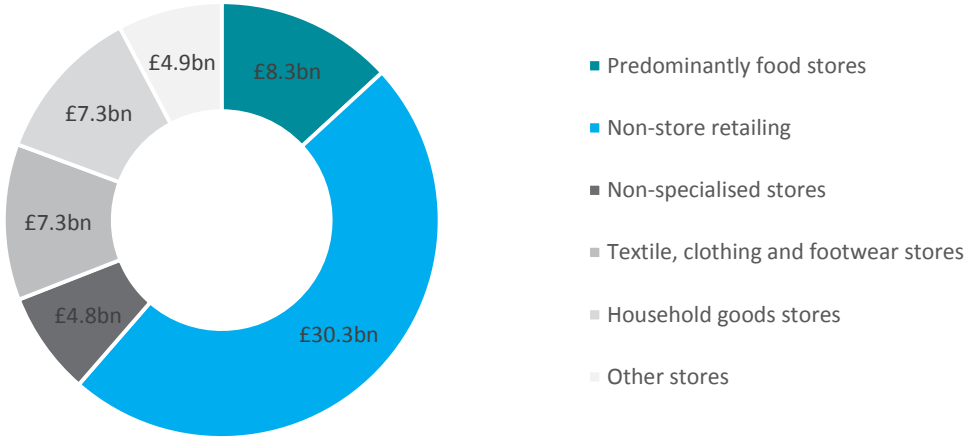
While this downward trend is good news, there is still room for improvement. The 4.5 million people that never use the internet are not able to reap the convenience benefits or the monetary savings yielded from shopping online. Supporting the development of Basic Digital Skills would give these individuals the necessary tools to enjoy the benefits of searching and shopping for goods and services online, which in turn could stimulate the online retail sector.

[21] https://digitalinclusion.blog.gov.uk/2018/01/23/the-basic-digital-skills-framework-is-being-updated-nows-your-chance-to-have-a-say-and-shape-its-future/

We recognise that a considerable portion of the online retail market is 'stealing away' from high street sales. However, the ability to shop online (having learnt Basic Digital Skills), and to look for better deals online, can be expected to unlock some latent demand, thus boosting a retail sector that faces increasing costs at a time consumer spending is being squeezed.

In 2017, internet sales accounted for 16.3% of all retail spending (excluding automotive fuel), representing a substantial increase from the 11.2% presented in the first edition of this report[22]. In monetary terms, the value of internet retail sales amounted to £59.3 billion in 2017, with the largest proportion of sales experienced by non-store retailing, i.e. internet and mail order only retailers (Figure 8).

Figure 8: Internet retail sales by retail segments in 2017, £ billion

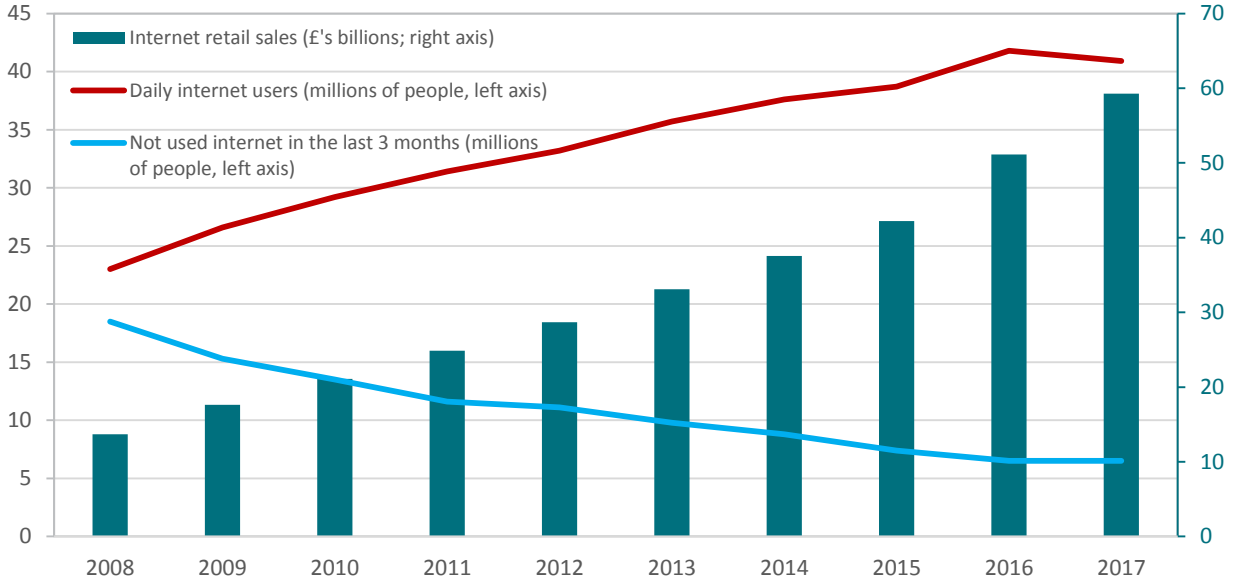


Source: ONS Retail Sales, June 2018

Annual average weekly online spending in 2017 reached £1.1 billion, up from £265 million in 2008, representing a 333% rise over nine years. Annual average weekly spending in 2017 was 16% higher than 2016 levels. The growth in popularity of online shopping is closely linked to the number of people using the internet regularly. Figure 9 shows how growth in annual internet sales has closely tracked the number of daily internet users. While this trend seems to have slowed down in 2017, the data suggests that increasing the number of regular internet users in the UK through investing in digital skills can lead to growth in the overall online retail market, which would drive the nation's retail sector.

[22] https://www.ons.gov.uk/businessindustryandtrade/retailindustry/timeseries/j4mc/drsi

Figure 9: Correlation between internet retail sales and the number of internet users in the UK, 2008 - 2017



Source: ONS, Cebr analysis

2.4 Online transactions with government

According to a UN E-Government survey, the UK government is the world leader in digital government[23]. The UK government 2012 'digital by default' strategy helped to build up this success story by deploying tools to incentivize the migration of some high-volume use public services to the internet. Exploiting the full potential of this migration is of high importance given the associated cost savings. The 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. The report stated that savings could be made from greater digitisation of transactions whilst maintaining, and ultimately improving service quality[24]. The bulk of the savings is driven by the fact that digital transactions are estimated to be 20 times cheaper than by phone, 30 times cheaper than by post and as much as 50 times cheaper than by face-to-face meetings[25].

Moreover, increasing the proportion of public services available online would not only help to realise these savings, and thus reducing the strain on the public finances, but it would also provide a benefit to users who can reduce the time they need to spend interacting with public authorities and services through traditional means, freeing up leisure time for other purposes.

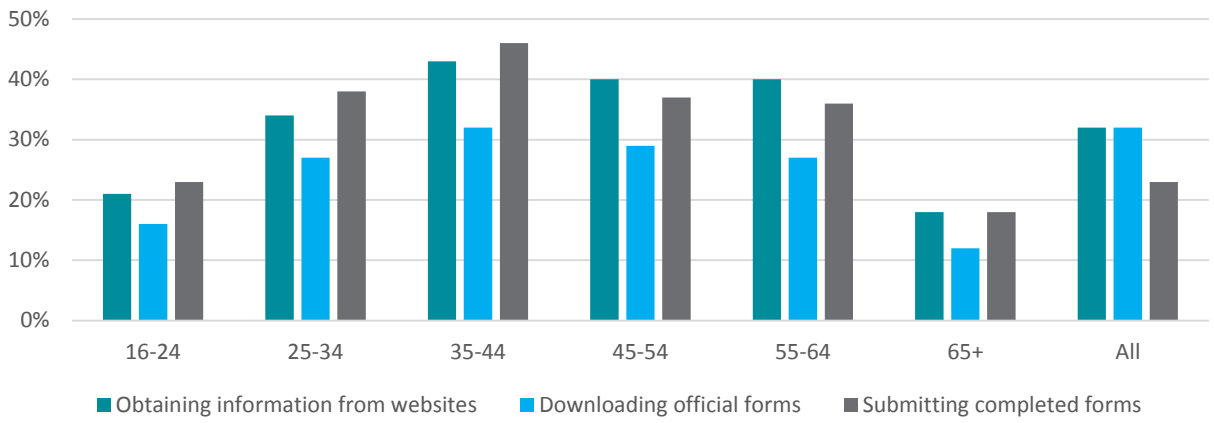
Considerable progress has been made since 2012. Figure 10 shows that in 2017 the most common reason for accessing a public authority or service website was to obtain information and download information, with 32% of UK adults having used the internet to complete these tasks.

[23] https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2016

[24] Government Digital Service (2012) "Digital Efficiency Report", accessed: [https://www.gov.uk/government/publications/digital-efficiency-report/digital-efficiency-report

[25] Cabinet Office and Government Digital Service, 2012, 'Digital Efficiency Report'.

Figure 10: Reasons for using the internet to interact with public authorities or services, by age group, 2017



Source: ONS Internet Access - Households and Individuals 2017

Adults in the 35-44 age group had the highest level of interaction with public authorities or services with just under half (46%) submitting official forms, 43% obtaining information from websites, and 32% 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 Government websites. While the latter was expected, since in this group there is a lower demand for this type of services (whether being it online, or being it in person), the lack of use of e-government services in the over 65 age group supports the argument that the digital divide might be preventing these individuals from fully exploiting e-government services. As a result, traditional channels will have to remain for the foreseeable future, but all UK adults learning Basic Digital Skills could accelerate the long term conversion process.

The UK government recognises that more steps need to be taken to broaden access to digital government services. In 2017, the UK government presented its new digital strategy, which includes the goal of maintaining the UK as a world leader in serving its citizens online. This involves not only building the capability to design, develop, and operate digital public services, but also transforming old government infrastructure, so that the demand for e-government services can increase.

In order to achieve this, the government has set out strategies to enhance the digital skills of the UK population, and it was under this goal that it established the DSP. This partnership aims to improve coherence of digital skills provision at a national level and to promote and support the establishment of Local Digital Skills Partnerships. Additionally, under the new digital strategy the UK government has also devised a plan to increase the pool of digital talent in its workforce; the ambition is to "(…) to have one of the most digitally skilled populations of civil servants in the world (…)"[26].

[26] https://www.gov.uk/government/publications/uk-digital-strategy/6-digital-government-maintaining-the-uk-government-as-a-world-leader-in-serving-its-citizens-online#fn:1

3 Investment required to have a digitally included population

In this section we present our estimates for the required investment to ensure that all UK adults learn Basic Digital Skills. There are two components that primarily drive this investment; the number of people that need to learn these skills over the next 10 years and the costs associated with supporting this learning process by 2028.

3.1 How many people will require support to gain basic digital skills?

Digital technology has become a common feature of our daily lives. Many of us cannot imagine doing our day to day errands or tasks without relying on some form of digital technology.

In 2005, 55% of all households in Great Britain had internet access[27]. By 2018, according to Ofcom data, nine in ten people had access to the internet at home[28]. While this represents substantial growth, there are still a significant number of people being digitally excluded. On top of this, as we approach the 100%-bound, the pace of change has been slowly decreasing. Therefore, it is not unreasonable to assume that without appropriate support we will never get to the target of ensuring that all UK adults learn Basic Digital Skills; if action is not taken a large proportion of the population will remain digitally marginalised.

Ipsos MORI[29] estimates that 11.3 million people in the UK did not have at least one Basic Digital Skill[30]. Based on demographic trends and trends in internet use, we project that this number will fall to 6.9 million by 2028. While this is a reduction from the number presented in our previous report (7.9 million by 2025), it is still represents a considerable share of people that will remain digitally marginalised well into the 2030s if no action is taken. To accelerate this process one needs to support the digitally excluded.

We have carried out an analysis to examine the likely size of the investment required to achieve the 100% Basic Digital Skills target by 2028. We followed the same methodology as in our 2015 report. While our models have been updated with the most recent data, and when possible we used more relevant data sources and assumptions, the process followed was the same. The first step was to establish the number of people that will require Basic Digital Skills support over the 10 year appraisal period. This involved estimating the number of persons without at least one Basic Digital Skill over the ten year period between 2019 and 2028 in the 'no training intervention scenario'.

The projections were calculated using the following data sources:

- The Lloyds Bank/ Ipsos MORI UK Consumer Digital Index Report 2018 survey was used to establish the existing size of the population without at least one Basic Digital Skill;
- ONS Internet Users 2018 statistics, which shows that the rate of change of non-internet users (a proxy for the acquisition of digital skills) has declined over time. Cebr used these statistics to model how the baseline population would decline up to 2028, across different age groups;

[27] ONS Internet Access – Households and Individuals, 2017

[28] https://www.ofcom.org.uk/about-ofcom/latest/media/facts

[29] Ipsos MORI, 2018, Lloyds Bank/ Ipsos MORI UK Consumer Digital Index 2018.

[30] It is important to note that this is a rounded number. Our model uses the exact figures provided by the Ipsos MORI survey and the most recent population data. Under these conditions, this number rises to 11.8 million in 2018.

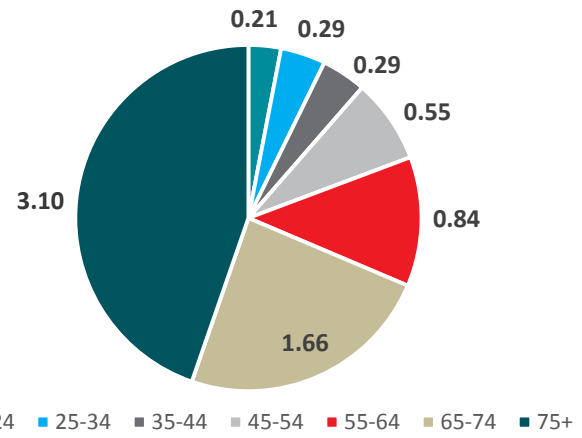
- ONS population projections by age group, which, combined with the above sources, were used to develop forecasts of the numbers of persons expected not to have digital skills by 2028.

It was assumed that existing digital skills training activities in the UK are not included within the projections of persons that will need training support.

Our results suggest that between 2019 and 2028, an additional 4.8 million people are expected to acquire all five basic skills without intervention. Of this total, the largest beneficiary age group is people between the ages of 65 and 74, with a projected 1.3 million individuals in this age category learning all five skills over the time period.

After taking into account those that will learn digital skills between 2019 and 2028 without support, it is estimated that a total of **6.9 million people will require support to gain Basic Digital Skills,** representing 12% of the UK adult population in 2028. Distributing this population over the ten year period, it is estimated that every year approximately **694,000 people** will need to be supported in order to learn Basic Digital Skills.

Figure 11: Projected number of persons that will require basic skills training, 2019 to 2028, by age group, millions

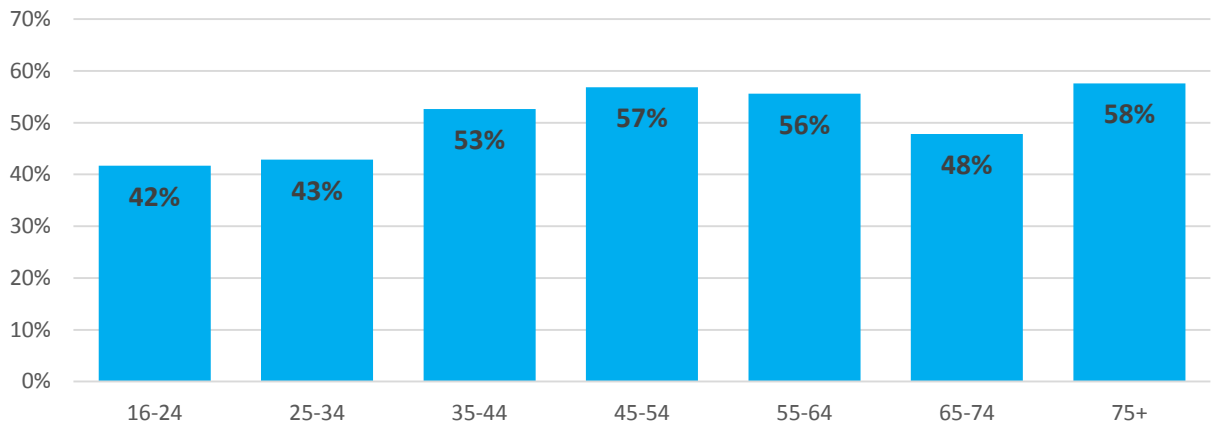


Source: ONS 2016-based sub-national population estimates, Cebr projections

As in the previous report, our estimate of the number of people that will require digital skills support incorporates a split between non-disabled adults and disabled adults. This distinction is based on the Equality Act 2010, which 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. While this does not preclude those individuals from learning the full five Basic Digital Skills, data suggest that disabled individuals tend to require a longer duration of tuition and closer supervision; this increases the cost of training per learner. Therefore, it is important to separately estimate the number of disabled and non-disabled persons that will require digital support.

Since the Ipsos MORI survey did not provide a distinction between disabled and non-disabled persons, we used new ONS data on Internet Users 2018 by disability status to estimate the number of equality-act disabled persons that would need learning support between 2019 and 2028. Our results show that a total of 3.7 million equality-act disabled persons require digital education support over the ten year period. As Figure 12 shows, these individuals are more heavily concentrated in the older age groups.

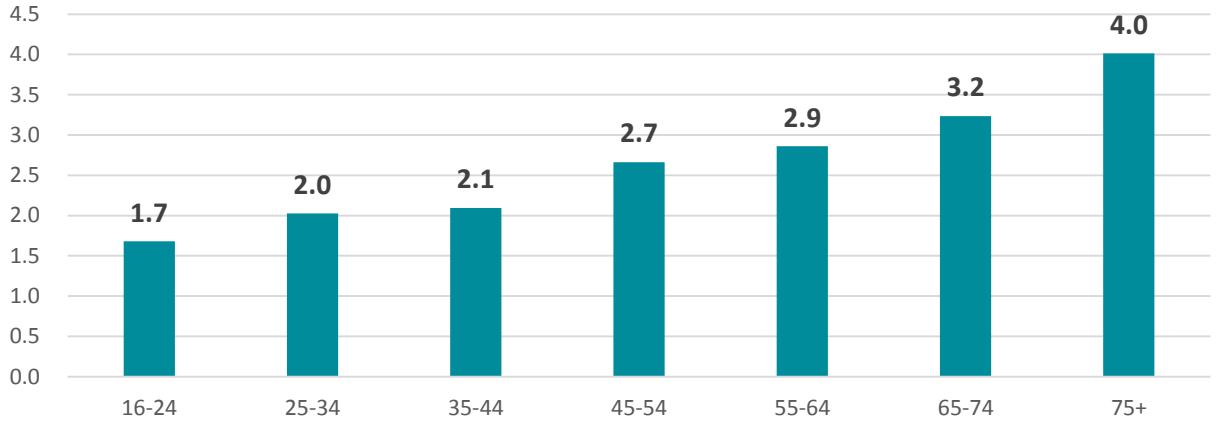
Figure 12: Proportion of persons requiring learning support who are classified as equality-act disabled, 2018, by age group



Source: Lloyds Bank/ Ipsos MORI UK Consumer Digital Report 2018, ONS Internet Users 2018, Cebr estimates

The average number of Basic Digital Skills that need to be learned for a person to be classified as having Basic Digital Skills also varies substantially by age group, but a trend is clearly visible in Figure 13; those in older age groups will require the highest amount of digital support.

Figure 13: Average number of Basic Digital Skills required, by age group (no. of skills)



Source: Lloyds Bank/ Ipsos MORI UK Consumer Digital Report 2018, Cebr calculations

There seems to also be a link between economic inactivity and unemployment, and lack of digital skills. Relying on data provided by Lloyds Bank and Ipsos MORI, we estimate that 62% of individuals (age 15+) without Basic Digital Skills are economically inactive compared to 29% for the sample of individuals with all five Basic Digital Skills. Similarly, the unemployment rate amongst individuals with all five Basic Digital Skills is 8%, while the same statistic for individuals without Basic Digital Skills stands at 11%.

Table 2 presents a breakdown of the annual number of individuals requiring digital training support by disability status, activity status and age group.

Table 2: Breakdown of the estimated number of individuals requiring Basic Digital Skills training support per year, by disability status, age group and economic activity status (thousands of people)

	Non-disabled			Disabled			
	Employed	Unemployed	Inactive	Employed	Unemployed	Inactive	Total
16-24	3.3	1.0	7.9	1.7	1.2	5.9	21.1
25-34	6.9	0.6	9.1	3.5	1.0	8.0	29.2
35-44	5.9	0.4	7.5	4.3	0.9	10.1	29.0
45-54	10.3	0.6	12.7	8.4	1.7	20.9	54.6
55-64	13.3	0.9	23.1	9.1	2.0	35.6	84.0
65-74	8.3	0.3	78.1	3.1	0.3	76.0	166.0
75+	3.0	0.2	128.4	1.2	0.0	177.3	310.2
Total	**51.1**	**4.0**	**266.8**	**31.4**	**7.1**	**333.7**	**694.0**

Source: Lloyds Bank/ Ipsos MORI UK Consumer Digital Report 2018, ONS 2016-based sub-national population estimates, Cebr calculations

3.2 What are the costs involved in supporting digital inclusion?

The final step to estimate the total investment required to ensure that all UK adults gain Basic Digital Skills is to establish the associated costs of supporting the learning process. We follow a similar approach to the 2015 report.

To establish the operational and capital costs attributable to each learner we relied on data from Good Things Foundation on the practical and attributable costs of setting up and operating a basic skills learning centre. These data came from seven digital skills centres.

The costs of learning Basic Digital Skills also take into account the intensity of the support required. To establish the level of intensity for each learner we used data provided by Lloyds Bank and Ipsos MORI. These data allowed us to extract a distribution of digital skills across age groups. As a result, our models incorporate costs that vary by age group and disability.

Overview of the practical costs of supporting digital inclusion

Since we first launched the report in 2015, there were no significant structural changes affecting the costs of supporting digital education. Therefore, any changes in these costs were a result of trends in inflation.

As before, the information provided by the digital skills centres shows that the average cost of supporting someone to learn Basic Digital Skills varies substantially. The main driver of this is the type of learner that attends a centre. Some people require one-to-one support, while others require minimal supervision and tuition. This affects the staff levels that each centre requires and, as a result, its costs. Centres that have a higher staff-to-learners ratios tend to have higher operational costs.

Another driver of the operational costs is the location of the centres. Centres that share their space with existing community facilities, such as libraries, are also able to share their costs with these other service providers. Overall, the costs include property rental, utilities, telephone/ internet, insurance, printing costs, volunteer costs and staff salaries.

Digital Skills centres also face a combination of capital costs to set up and run their operations; including flooring, furniture, stationery, IT equipment and signage. To estimate the annualised value of the capital investment involved we used a straight line depreciation formula. By comparing these annual costs with

the number of people that attend courses at the centre each year, we estimated that capital costs per user represent between 1% and 10% of the overall costs of tuition.

Combining the different data points above with the specific attributes of learners, and adjusting for inflation, Cebr estimates that the **overall cost per learner ranges from £42 to £380**.

Variation in the cost of supporting digital inclusion

To guarantee that our modelling process accurately reflects the varying support needs of different learners, we took into account how specific attributes of learners influence the costs of the digital skills centres. There are three main drivers of the variation in the cost of training: disability status, the level of existing digital skills and age of the learner. More detail on each is provided below, as we had in the 2015 report.

- ***Disability status –*** *Equality Act disability status incorporates people with both mental and physical impairments which limit the ability of persons to complete daily tasks. This means that some people classified as being disabled may take longer to learn Basic Digital Skills relative to others which increases the requirement for one-to-one tutors and therefore the cost of provision.*
- ***The level of existing digital skills support programmes –*** *People who have never had formal or informal digital skills support will take more time to learn each skill relative to those who have already had some digital skills training. This increases the cost of tuition per user.*
- ***Age of the learner –*** *Survey evidence shows that a higher proportion of older age groups have no digital skills, relative to younger age groups. This means that on balance, it will take the average person in older age groups more time to learn a Basic Digital Skill relative to a younger person.*

Once we incorporate the different costs drivers described above in our models, we are able to obtain an estimated cost per learner. A summary of these are presented in Table 3 below.

Table 3: Average operating and capital cost per learner, by age group and disability status

	Non-disabled		Disabled	
	Operating cost per learner	**Capital cost per learner**	**Operating cost per learner**	**Capital cost per learner**
16-24	£41	£1	£154	£5
25-34	£50	£2	£186	£6
35-44	£51	£2	£192	£6
45-54	£65	£2	£244	£8
55-64	£70	£2	£262	£9
65-74	£79	£3	£297	£10
75+	£98	£3	£368	£12
Average	**£82**	**£3**	**£307**	**£10**

Source: Lloyds Bank/ Ipsos MORI UK Consumer Digital Report 2018, Digital skill centres' own estimates, Cebr calculations

Investment required to ensuring that all UK adults learn Basic Digital Skills

Table 4 presents the total investment required to support the learning process of all UK adults who are not digitally included. The total investment is calculated by combining the results from Table 2 and Table 3. We estimate that between 2019 and 2028, an **investment of £146 million per year will be needed** in

order to ensure that all UK adults learn Basic Digital Skills. **The present value of such an investment is £1.22 billion (2017 prices)[31].**

Table 4: Summary of annual operating and capital costs, 2017 prices

	No. of non-disabled (thousands)	No. of disabled (thousands)	Total operating cost (£m)	Total capital cost (£m)	Total investment cost (£m) = operating + capital costs
16-24	12	9	£2	£0.1	£2
25-34	17	13	£3	£0.1	£3
35-44	14	15	£4	£0.1	£4
45-54	24	31	£9	£0.3	£9
55-64	37	47	£15	£0.5	£15
65-74	87	79	£30	£1	£31
75+	132	179	£79	£3	£81
Total	**322**	**372**	**£142**	**£5**	**£146**

Source: Digital skill centres' own estimates, Cebr calculations

The required investment is slightly below what we presented in our previous report even when adjusted for inflation[32]. The main reason for this is that the number of learners and the intensity of the support required has decreased across the majority of the age groups and also by Equality Act 2010 disabled people. This is good news; it suggests that over the last three years more people have learnt digital skills (either formally or informally), reducing the group of people that is currently being digitally excluded from society.

However, the total number of people who need digital skills support still remains at high levels. More needs to be done to address this issue, especially if the UK is to adjust to the needs of the future of work agenda and prepare for the challenges of rapid digitisation. On top of this, the Lloyds Bank Consumer Digital Index reports show that over previous years the rate of decrease in the number of people without Basic Digital Skills has plateaued for some age groups. This suggests that we might be approaching a situation in which only with further support will we be able to reduce the share of people without Basic Digital Skills to levels close to the 0%-bound.

Cost to learners from purchasing personal digital devices

There is a separate set of costs that need to be taken into consideration when assessing the size of the investment required to ensure that all UK adults learn Basic Digital Skills. Once a person develops the necessary digital skills, to be able to take full advantage of them he or she needs to have access to internet-enabled digital devices such as laptop computers, tablets and smartphones.

Nowadays, a significant proportion of digital tasks can be done over a smartphone. Given that smartphones are a low cost way of accessing the internet, especially when compared to laptop computers and tablets, we assumed that the price of a smartphone is the minimum cost an individual will have to take on to be able to be digitally included.

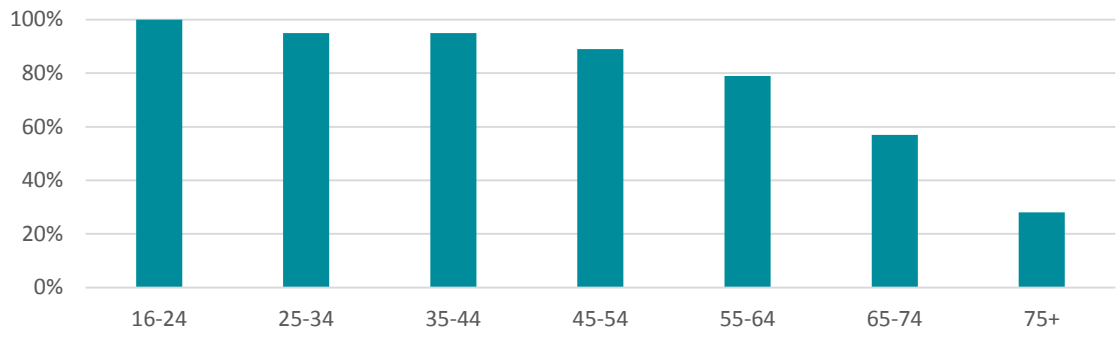
According to the most recent Lloyds Bank/ Ipsos MORI UK Consumer Digital Report survey, over 80% of UK adults own a smartphone. While this is represents a significant majority of the population, smartphone ownership is unevenly spread among age groups. Figure 14 presents the rate of smartphone ownership by

[31] Using a discount rate of 3.5%, from the Treasury's Green Book.

[32] Our 2015 report estimated an investment of £158 million per year with a present value of £1.31 billion (2014 prices).

age group. There is a clear downward trend in ownership as you approach the older groups of the population; only 28% of the over 75s own a smartphone. This compares with 100% of the individuals in the 16-24 age group.

Figure 14: Smartphone ownership by age group



Source: Lloyds Bank/ Ipsos MORI UK Consumer Digital Report 2018

The trend above suggests that in many cases learners will need to purchase their own digital devices to be able to reap all the benefits from learning Basic Digital Skills. This is the case since the majority of digitally excluded individuals are concentrated in the older age groups of the population. By combining the data on smartphone ownership with Ipsos MORI data on Basic Digital Skills, we were able to project the smartphone ownership rate in households where individuals lack digital skills.

The missing piece of information is the associated cost of purchasing a smartphone. Using smartphones total sales and total volume from GfK we were able to estimate the average price of smartphones between 2013 and 2017. Based on these data, we computed an average growth rate of smartphone prices. Given the latest trends in the market, the average growth rate stands 3.7%. Assuming that average smartphone prices over the next ten years will follow the latest trends, we estimate that the user costs of purchasing personal devices will decline from £69 million in 2019 to £26 million by 2028 (2017 prices).

This represents an increase in the user costs of purchasing personal devices from our 2015 report. Driving this revision are the recent trends observed in the smartphone market. Smartphones are becoming more powerful, offering features that previously only a laptop or desktop computer would be able to offer. The consequence of this is that the user costs associated with supporting the development of digital skills are higher than what we had previously estimated. However, it is also important to take into account that an average price hides the prices at the extremes of the distribution. It is still likely that most learners will be able to access smartphones at progressively smaller prices if they go for the cheaper options available in the market. These have fewer features than the high-end options, but still offer individuals the opportunity to access all the benefits associated with being digitally included.

Summary of the learning and learner-specific costs

The investment required to ensure that all UK adults learn Basic Digital Skills over the next ten years is substantial. A total of 694,000 people need to be supported each year, and a share of these people also need to purchase internet-enabled digital devices.

Overall costs per learner range from £42 to £380, depending on the age of the learner, their disability status, and previous levels of digital inclusion. Combining these costs with the projected number of persons that will require digital education support each year, we estimate that £146 million will need to

be invested each year between 2019 and 2028. This corresponds to a present value of £1.22 billion (2017 prices).

Cebr also computed the user costs associated with purchasing an internet enabled device, such as a smartphone. These are estimated to have a present value of £373 million over the ten year period (2019 to 2028).

Combining the two sources of costs above leaves the total present value of the required investment at £1.59 billion (2017 prices) over the ten year period.

4 The economic benefits of supporting digital inclusion to the UK economy

In this section we explore the economic benefits of supporting digital inclusion. We focus on eight channels: time savings to the individuals, increased individual earnings, enhanced employability, online retail transactions benefits, improved social inclusion, the supply of more efficient health services, greater digitisation of government transactions, and reduction in digital skills shortages vacancies. These channels are considered to be the eight most likely channels through which the benefits will accrue to individuals and the economy.

There are two main novelties in our 2018 research. Firstly, we consider a separate tranche of benefits for the government. These are the digital efficiency savings that arise from supporting the development of a digitally included population. Secondly, we include corporate benefits. Particularly, we focus on how digital inclusion can help companies fill their digital skills shortages vacancies.

4.1 Time-savings

The number of transactions that can be performed online has grown substantially over the last decade. Advances in technologies have allowed consumers to undertake daily tasks, such as accessing their bank accounts or applying for a loan, from the comfort of their home. There are fewer and fewer transactions that require consumers to leave their house and stand in a queue while waiting to be assisted. As a result, using these online services is quickly becoming the norm. In 2017, 63% of adults in Great Britain report regularly using the internet for banking services. In 2007, this share stood at 30%.[33]

Although not as impressive, the share of adults regularly using the internet to make a doctor's appointment has also increased. In 2016, this share stood at 15%, while as recently as in 2014 it corresponded to 10% of the adults in Great Britain. This suggests that there is scope to use online services to achieve time-savings in transactions related to government services. According to the latest 'Internet Access - Households and Individuals' ONS publication[34]:

- 32% of adults in Great Britain interacted with public authorities or services online to obtain information from websites;
- 32% of adults in Great Britain interacted with public authorities or services online to submit completed forms; and
- 23% of adults in Great Britain interacted with public authorities or services online to download official forms.

The move towards the digitisation of daily transactions can bring significant benefits. Being able to perform such tasks online can save consumers a significant amount of time. The waiting-time and transport-time savings allow consumers to spend more time and money in leisure activities. Yet, only digitally included consumers can enjoy these savings.

In this section we focus on the benefits of ensuring that all UK adults learn Basic Digital Skills in terms of the time-savings associated with undertaking financial and government transactions online. To estimate

[33] ONS, 2015, 'Internet Access - Households and Individuals, 2017'.

[34] ONS, 2015, 'Internet Access - Households and Individuals, 2017'.

these benefits we followed the same methodology as in the 2015 report. We describe the steps taken below:

- ***Step 1 - Estimate the total time saved in online transactions.*** According to a study by the Security Identity Alliance, consumers save 30 minutes on each digitised transaction[35]. The most recent data for the financial year ending in 2017 suggest that, across all services provided by the UK government, individuals conduct on average 55 government transactions online per year[36]. Combining the two implies that individuals could save 28 hours per year from undertaking government transactions online. Further, research by One Economy puts the hours saved through online banking at 33 hours a year[37].

- ***Step 2 - Estimate the impact of digital skills support on the number of transactions each individual conducts online.*** Once the digitally excluded population has learnt Basic Digital Skills, these individuals will be able to conduct online transactions. We have assumed that half of all financial and government transactions would be undertaken online by the individual once he or she becomes more digitally included.

- ***Step 3 – Estimate the hours saved by an individual who has recently learnt Basic Digital Skills.*** By combining the results from Step 1 and Step 2 we were able to compute that an individual who has recently learnt Basic Digital Skills is able to save 30 hours in leisure time per year from undertaking government and banking transactions online rather than in person or on the phone.

- ***Step 4 – Estimate the value of the time saved.*** To measure the monetary value of the hours saved we have relied on the Department for Transport's (DfT) estimates of the value of leisure time[38]. Similar to the 2015 report, we focused on leisure time valuations since these activities are mostly undertaken during personal time. Combining the results from Step 3 with the DfT data we estimate that by 2028 a total of 208 million hours could be saved by the 6.9 million people who need to learn Basic Digital Skills; this is valued at £1.1 billion. Figure 15 illustrates our results.

In our 2015 report we estimated that the total hours saved from online transactions stood at 236 million and were valued at £1.5 billion. Driving this discrepancy are two factors. Firstly, the latest DfT estimates on the value of leisure time were revised downwards[39]. Accordingly, the value of the time saved from undertaking online transactions also decreases. Secondly, the number of people who need digital skills support over the ten year appraisal period dropped from 7.9 million to 6.9 million. As a result, the total number of hours saved and the total value of the hours saved from ensuring that all UK adults learn Basic Digital Skills had to necessarily fall. However, it is important to bear in mind that this second effect is actually good news, since it means that, compared to 2015, we currently have more people who are digitally included.

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[35] Security Identity Alliance, "eGovernment services would yield up to $50bn annual savings for Governments globally by 2020", (2013): https://secureidentityalliance.org/public-resources/14-13-11-19-sia-egov-study/file

[36] https://www.gov.uk/performance/services?sortby=number_of_transactions&sortorder=descending

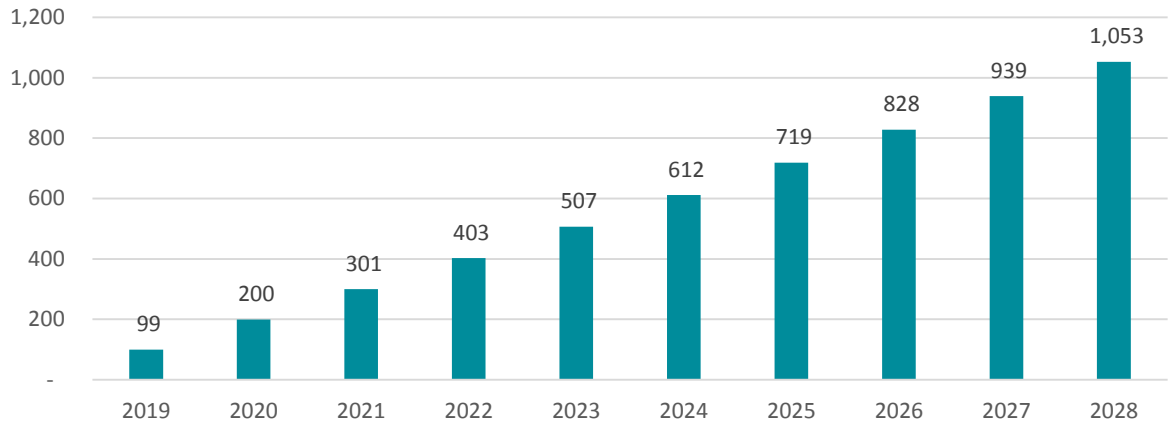
[37] Just Economics for BT,(2014)," Valuing Digital Inclusion: Calculating the social value to individuals of going online",

[38] Similar to the way our hourly wage represents the value of our working time, the DfT's leisure time valuation attaches a monetary value to our leisure time, i.e. the time we spend outside of work.

[39] The methodology used by the DfT in the latest Web TAG workbooks has been reassessed to incorporate a more accurate value of leisure time. The new estimates of VTT could also be part due to changing preferences and conditions of travel between studies. Mackie et al mentioned that the values may vary due to income and socio-economic characteristics of travellers, as well as the composition of trips and purposes; https://www.gov.uk/government/publications/values-of-travel-time-savings-and-reliability-final-reports

It is also important to reiterate the same points mentioned in our 2015 report. While the £1.1 billion may always be a realisable financial gain, it does constitute a welfare gain since it allows individuals to use more of their leisure time for more enjoyable pursuits even if they don't chose 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.

Figure 15: Cumulative value of time saved from undertaking government and banking transactions online, through the use of Basic Digital Skills, 2019-2028 (£ millions)



Source: Security Identity Alliance, Just Economics, Government Digital Service, BT Report, DfT WebTAG 2018, Cebr analysis

4.2 Earnings

The importance of digital inclusion has grown as the pace of digitisation in the workplace accelerated. In Section 1, we discussed in detail the relevance of digital inclusion in the context of ILO's future of work agenda. Some of the most relevant points raised by ILO are on skill policies and on the impact of technology on the quality and quantity of jobs. While there are several controversial debates around the impact of digitisation on job security, it is widely accepted that there is a need to support the development of digital skills so that workers succeed in a digitised work environment. This is not a contentious view since the argument is that supporting individuals in this area can minimise the chances of having them marginalised in the workplace.

Once individuals learn Basic Digital Skills they are able to be more productive at their current jobs. On the other hand, these new skills can also open the possibility of moving into roles that require a higher skill level. As a result, they are rewarded with higher salaries. These individual earnings benefits flow into the wider economy through two main channels:

- ***Individuals:*** *Firstly, individuals who learn Basic Digital Skills benefit from an increase in earnings and, hence incomes. Additional household spending drives the purchase of goods and services in the wider economy, which have knock-on effects on the business economy.*

- ***Government:*** *Following from the boost to earnings that accrue to individuals with Basic Digital Skills, governments benefit from increased employer and employee National Income Contributions (NICs) and income tax benefits.*

We estimate that individuals who have learnt Basic Digital Skills could expect a lifetime increase in their average hourly earnings of 2.8%. This is a conservative assumption based on research from the Centre for

Education and Economics[40]. We then apply this wage premium to the lowest quartile of employees' earnings in the UK. While this is also a conservative estimate, available evidence suggests that digitally excluded people tend to have below average earnings. For instance, Figure 4 shows that the share of people without Basic Digital Skills is highly concentrated in low skilled occupations.

New evidence from the OECD validates our assumption of a 2.8% increase in average hourly earnings. According to a 2016 paper on the effect of digital skills on earnings, one additional point in the Programme for the International Assessment of Adult Competencies (PIAAC) on Information Communication Technology (ICT) skills leads to a 0.6% wage increase[41]. It would not be unreasonable to assume that supporting the development of Basic Digital Skills could provide a boost to the UK's average ICT score. The difference between the UK average ICT score and the scores of countries such as Norway, the Netherlands and Sweden falls in the range 1 to 10 ICT points. If we assume that ensuring that all UK adults learn Basic Digital Skills increases the average ICT score in the UK by 5 points, we would get that the corresponding boost in earnings would be 3% - in line with our 2.8% assumption.

We estimate that if each year we support the learning process of the UK adults who are digitally excluded (of which 82,000 are employed people) then, by 2028, Basic Digital Skills could facilitate a boost in net earnings across the economy of £343 million[42][43]. This is equivalent to an average net earnings increase of £417 per person trained per year from learning Basic Digital Skills. Figure 16 presents our results.

On top of the net earnings boost to individuals is the additional tax contributions that make up the remainder of the gross boost to wages and salaries - income tax, employees' and employers' NICs[44]. By 2028, we predict the government to benefit from at least an additional £228 million in additional tax receipts per year.

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

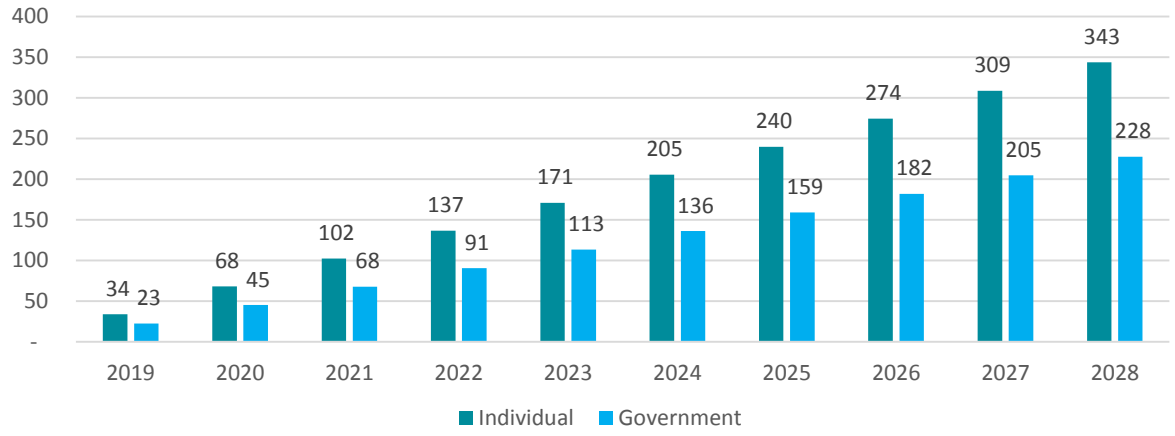
[41] http://www.res.org.uk/view/art1Oct16Features.html

[42] This figure refers to net earnings. It captures the difference between the earnings that would accrue to individuals with Basic Digital Skills, relative to the earnings they receive without Basic Digital Skills.

[43] We assume that the returns to Basic Digital Skills stay fixed over time.

[44] We acknowledge that individuals from the lower earnings quartile could still be earning working tax credits and/or child tax credits from the government, despite realising a rise in salary. This has not been accounted for in our model.

Figure 16: Cumulative absolute net earnings benefits to individuals, and to the government through the use of Basic Digital Skills, 2019-2028 (£ millions)



Source: Centre for Education and Economics, ONS, Cebr analysis

Similar to what we observed in the section above, there seems to be a reduction in the total benefits from ensuring that all UK adults learn Basic Digital Skills. In 2015, the cumulative absolute net earnings benefits to individuals and to the government through the use of Basic Digital Skills were £358 million and £243 million, respectively. However, the number of people that need to be supported has fallen by one million. Once again, this is a positive story. The magnitude of the earning benefits is lower because there are fewer digitally excluded people in 2018 than what we had in 2015.

Another caveat applies here. These gains are only feasible if employers are able to observe the productivity improvements amongst those learning Basic Digital Skills. Moreover, the employer needs to share the productivity gains through higher wages and salaries.

4.3 Employability

Supporting the development of Basic Digital Skills can also help individuals who are out of work to find suitable employment. The ability to search for jobs online brings considerable benefits to individuals and society. Largely, the internet has reduced the opportunity costs of searching for a job. We explore the main reasons behind these benefits below.

On one hand, it allows prospective candidates to find job opportunities quicker and more efficiently. Nowadays, a jobseeker is able to find a myriad of opportunities concentrated in a handful of websites, which makes their online search more economical and effective than traditional methods. Further, these websites offer the possibility to filter the job opportunities according to the job characteristics and the individuals' preferences and experience. This minimises the number of irrelevant postings candidates have to go through until they find suitable job opportunities.

On the other hand, employers know that by posting vacancies online they can access a wider pool of prospective candidates. Yet, given the ability of jobseekers to filter vacancies, this wider pool of candidates is also much more likely to contain better suited applicants than when firms use traditional posting methods. This improves the quality of the match between the employers' requirements and the skills and demands of jobseekers.

Given the relevance of this topic to the future of work agenda, ILO's issue brief 'The impact of technology on the quality and quantity of jobs'[45] discusses how technology can improve the functioning of the labour market by helping address the risks of vacancy mismatches and of long term unemployment. Some of the examples presented are around the ability of digital platforms, such as LinkedIn and Monster.com, to connect individuals with work opportunities, helping to correct skills mismatches. Another example is the implementation of artificial intelligence and big data techniques to improve recruitment processes; the idea being that part of the recruitment process can be automated, saving the time of jobseekers and employers.

However, to enjoy any of the benefits described so far individuals need to have a minimum level of digital skills. When individuals are not able to search for a job online some might end up with jobs that are not tailored to their skill set, while others might exit the economically active population due to the high opportunity cost associated with job hunting. This is another way through which digital exclusion can lead to the marginalisation of a group of individuals. Supporting the development of digital skills, so that individuals are able to use online tools to search for a job, could increase labour market efficiency and inclusion.

According to the McKinsey Global Institute, online talent platforms could boost global GDP by 2% by 2025, while increasing employment by 72 million full-time-equivalent positions[46]. The same study also discusses the ability of these platforms to: reduce the duration of unemployment, suggesting that as many as 230 million people could find new jobs more quickly; and to reduce skills mismatches, suggesting that as many as 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.

In the 2015 report, we presented other relevant evidence to support our view that online tools can facilitate the job searching process, this included:

- *Kuhn and Mansour (2011) revealed that internet job-searching reduces the duration that an individual might be unemployed for by 25%[47]. This is in contrast to Kuhn and Skuterud (2004)'s initial finding that internet job-searches were associated with longer unemployment durations during the period 1998 to 2000[47]. This reversal in findings illustrates the increasingly positive role the internet has on reducing unemployment.*

- *Stevenson (2008) found that if internet penetration in a community rose by 10%, the probability that someone unemployed would send out a CV increased by 2%, while the likelihood of a person contacting a private recruitment agency rose by 10%[48].*

- *PWC incorporates existing literature to identify that between 3.5% and 7.5% of unemployed people would be helped into employment if they obtained digital skills[49].*

There is a wide body of evidence supporting the view that the internet can bring significant gains both at a micro and macro level. A significant number of users is already reaping these benefits. In 2017, 22% of the adults in Great Britain had recently used the internet to look for a job or send a job application[50]. While

[45] http://www.ilo.org/wcmsp5/groups/public/---dgreports/---cabinet/documents/publication/wcms_618168.pdf

[46] https://www.mckinsey.com/featured-insights/employment-and-growth/connecting-talent-with-opportunity-in-the-digital-age

[47] Kuhn, P. and Mansour, H. (2011) "Is the Internet job search still ineffective?"

[48] Stevenson, B. (2008) "The internet and job search", NBER

[49] PWC, (2009) "Champion for Digital Inclusion: the economic case for digital inclusion"

[50] ONS publication 'Internet access - Households and individuals, 2017'.

this is an increase from the 14% observed in 2007, there is still room to widen the group of people who can make use of online tools to search for a job. We estimate that 111,000 unemployed people are currently being excluded from access to relevant job opportunities and the chance to enter employment faster because they lack digital skills. Furthermore, given the fast pace of digitisation it would not be surprising to have the majority of companies only accepting online applications over the next decade. Therefore, without action this digital exclusion is likely to grow even further.

Technological improvements have brought the rise of remote working. In 2017, the rate of home workers stood at 14%. While the increase in this rate has been recently slowing down, it still represents a rise of 15% in the level of home-workers compared to 2010[51]. Remote working technologies increase the flexibility of working arrangements, enabling people to balance their personal commitments and responsibilities with the demands of working life. As a result, it can encourage people to re-enter the workforce.

However, such flexible working arrangements involve the use of digital technologies and hence requires the employee to have learnt Basic Digital Skills. To the extent that these skills, or the lack thereof, are a barrier to re-entering the workforce due to the inability to work remotely, the acquisition of these skills by more people is likely to encourage more economically inactive people to re-enter the workforce if remote working is made possible.

We therefore attempt to estimate the employability impacts of ensuring that all UK adults learn Basic Digital Skills. To do this we follow the same approach as in the 2015 report:

- *Of the economically inactive population in the UK, we estimate that 601,000 would need to learn Basic Digital Skills each year before they have adequate levels of digital skills to work remotely. Once they are more digitally included, Cebr's work for Citrix suggests that, given the ability to work remotely, over a fifth (21%) of people who are currently economically inactive would be more inclined to start looking for a job[52]. We apply this proportion to those who need to be supported in the digital skills learning process. Furthermore, by taking the mid-point from the PWC estimates presented above, we assume 5.5% of those who would be more inclined to look for employment, will find a job as a result.*

- *We then apply the probability that economically inactive people will enter the workforce (5.5%) to the lowest earnings quartile of the economy. This identifies the increase to earnings across the economy as a result of supporting the economically inactive in their digital skills learning process, which can encourage them to enter the workforce.*

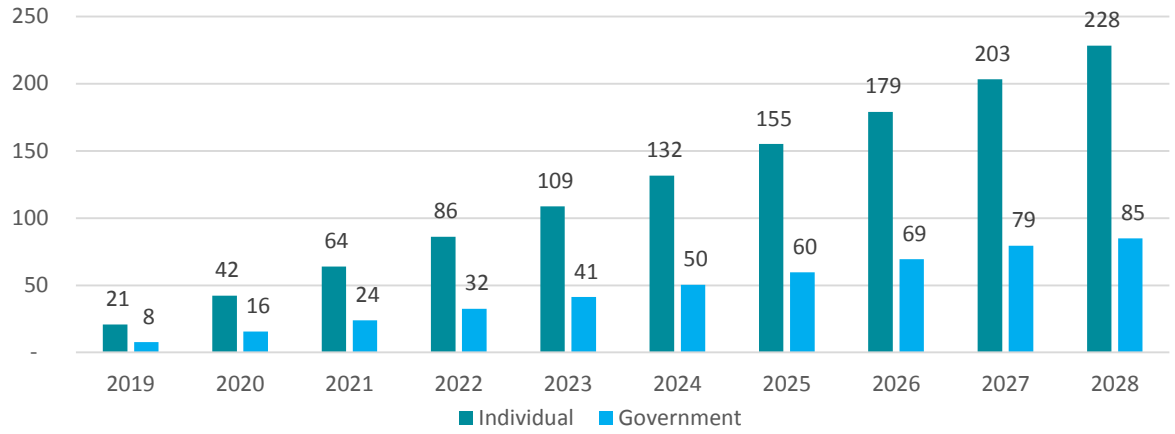
The results of our analysis are presented in Figure 17. We estimate that by 2028 the total employability benefits to individuals will amount to £228 million. This increase in employment also leads to a boost in Government earnings. As the number of people employed rises, the Government benefits from increased income tax receipts, and employer and employee NICs. Further, as unemployment declines, we expect the Government to benefit from paying fewer people Jobseekers' Allowance (JSA)[53]. We therefore estimate a £85 million increase in Government tax receipts and reduction in JSA payments by 2028.

[51] ONS Characteristics of Home Workers, 2014 and LFS Home worker rates and levels, January to March 2017.

[52] Cebr, (2014), "The productivity value of the untapped workforce: a study into the potential economic impact of a flexible working culture: a report for Citrix."

[53] We only account for a reduction in JSA claims (assuming an average of £69.33 per week). We do not account for other government transfers such as the Disability Living Allowance and child tax credits, which may be affected by an increase in employment.

Figure 17: Cumulative employability benefits to individuals, and to the government through supporting the acquisition of Basic Digital Skills, 2019-2028 (£ millions)



Source: PWC, Citrix, ONS, Cebr analysis

An important assumption we have made here is that there will be sufficient demand to absorb the increase in labour supply. We are confident that this is not an unrealistic assumption given the associated productivity improvements discussed in Section 4.2. For instance, these improvements can stimulate investment, which usually leads to job creation.

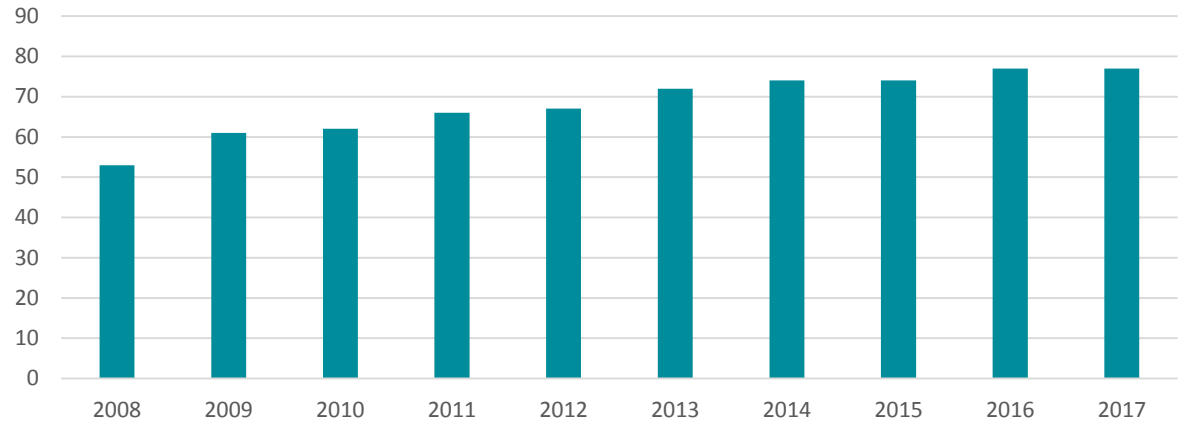
4.4 Retail transaction benefits

Technological advances have also led to the development of a different type of digital platforms which created the online marketplace. Similarly to job search digital platforms, the online marketplace allows buyers to shop quicker and more efficiently, while also increasing the quality of the match between buyers and sellers. From the comfort of their homes, consumers are able to search for products and services across different brands, between categories and within price brackets, generating significant browsing-time and transport-time savings. The rise of comparison websites also allowed consumers to quickly find the best deals and make more informed decisions. This led to an increase in price transparency, which promoted competition in the market and, as a result, substantial price savings for consumers.

On top of this, in the online marketplace companies are not constrained by shelf space and therefore are able to offer consumers a greater variety of products and services. Moreover, the costs associated with selling a product online tend to be lower since companies do not have to face operational costs such as high-street rents and in-store branding. The lower operating costs encouraged new firms to enter the online market, resulting in fierce competition, which has also led to lower prices.

Online shopping is rapidly becoming the norm. While just over half of UK individuals purchased goods and services over the internet in 2008, the latest figures show that over three quarters of the adult population made an online purchase within the last 12 months (see Figure 18).

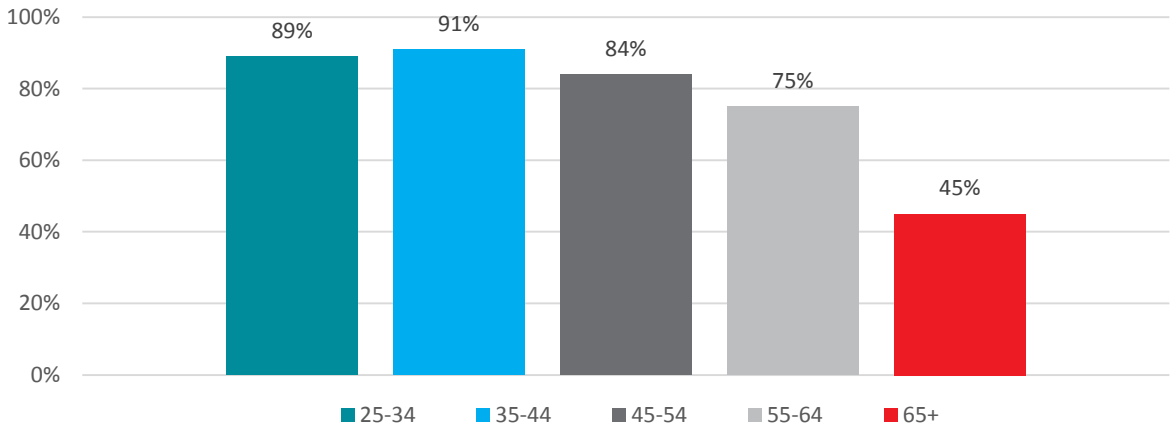
Figure 18: Proportion of GB adults having shopped online in the last 12 months



Source: ONS

However, the savings described above are not equally distributed across the UK population. While the overall rise in online shopping is apparent in Figure 18, there is a considerable discrepancy across age groups. As shown in Figure 19, in 2017 only 45% of the people over 65 had shopped online; this compares with 91% of adults in the 35-44 age group.

Figure 19: Proportion of individuals shopping online in Great Britain, by age group, 2017



Source: ONS 'Internet access households and individuals, 2017'

These results are not surprising. The share of digitally excluded people tends to be heavily concentrated in the older age groups, and without digital skills individuals are not able to shop online and enjoy most of its benefits. This is another channel through which digitally excluded people can be marginalised. However, if they were to learn Basic Digital Skills extensive savings could accrue to these individuals. For instance, PWC estimates that approximately £4.5 billion of savings per year are lost by digitally excluded households, who cannot benefit from savings made from online transactions[54].

We relied on the Lloyds Bank CDI 2017 report to estimate the transactions benefits that could be generated if we were able to ensure that all UK adults learn Basic Digital Skills. According to this study, 50% of those

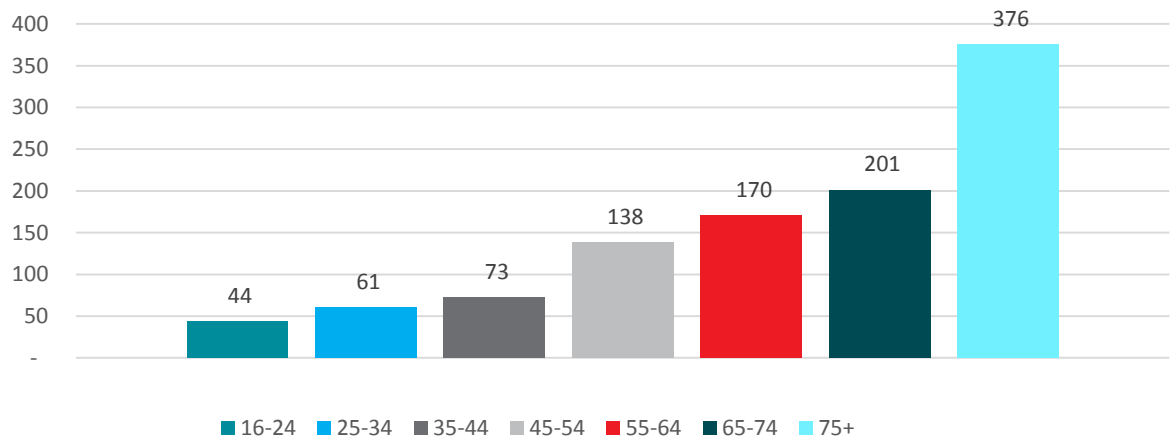
[54] PWC, (2009) "Champion for Digital Inclusion: the economic case for digital inclusion"

online take advantage of cashback and discount sites, saving an average of £444 per year[55]. We therefore assume that having learnt Basic Digital Skills, 50% of the newly digitally included individuals will take advantage of online offers and discounts and save £444 per year.

To guarantee that our models capture the expenditure patterns of the UK population, such as the ones observed in Figure 19, we used the Family Expenditure Survey to compute the variation in savings by age-group. After incorporating the likelihood that younger people spend more online and therefore save more relative to those in older age groups[56], we applied the savings by age-group to the number of people that need to be supported to ensure that all UK adults learn Basic Digital Skills.

Figure 20 presents our results. We estimate that transaction benefits would amount to £1.1 billion by 2028. These benefits constitute a welfare improvement, allowing consumers to extract greater consumer surplus relative to shopping through traditional means. The lion's share of these savings is allocated to the individuals over 75, since this group also has the greater proportion of people without Basic Digital Skills. By 2028, we expect those aged over 75 years old to save £376 million, while supporting the development of digital skills in the 16-24 group is expected to lead to a total transaction benefit of £44 million.

Figure 20: Cumulative transaction benefits arising from supporting the development of Basic Digital Skills, by age-group, 2019 – 2028, £ millions



Source: Lloyds Bank CDI 2017 report, ONS Family Expenditure Survey 2017, Cebr analysis

4.5 Communication benefits

Digital platforms can help reduce social exclusion or isolation. Nowadays, it is easier for individuals to stay in touch with their friends, family and local community by the use of tools such as email, video conferencing or social media.

However, the benefits of these technologies do not reach digitally excluded people; and in most cases these are the people who would benefit the most from its use. Social isolation is particularly prevalent among older age groups and these groups tend to have a higher concentration of people without Basic Digital Skills. We therefore argue that ensuring that all UK adults learn Basic Digital Skills could help to reduce social exclusion and social isolation, which in turn would boost the levels of wellbeing experienced

[55] https://www.lloydsbank.com/assets/media/pdfs/lloyds-bank-consumer-digital-index-2017.pdf

[56] We achieve this by applying the same age variation in household spending to online spending, using data from the ONS Family Expenditure Survey 2017.

by individuals. We present below a summary of the existing evidence supporting the link between social inclusion and wellbeing.

- Berkman and Glass[57] show how social networks can provide support as well as opportunities for meaningful social engagement. The authors also suggest that the death risk for people who are socially excluded is two to five times higher than the risk for individuals who have social connections.

- Research on the social determinants of health[58] suggests that supportive relationships can encourage healthier behaviour patterns. A separate study on this topic[59] found evidence in the Finnish population that social support strengthened mental health.

- VicHealth research on the determinants of mental health and wellbeing[60] presents a variety of evidence on the links between connectedness and individuals feeling valued and respected. The evidence presented also suggests that social inclusion can also help individuals avoid or reduce stress, anxiety and depression.

- One of the most relevant studies for the purposes of our research was conducted by FreshMinds for UK online centres[61]. The study found that when individuals used the internet the proportion of people feeling close to their community grew by 11 percentage points. Similarly, the proportion of people who felt in touch with their family grew by 14 percentage points once they had used the internet.

The evidence described above backs our view that supporting the development of Basic Digital Skills can provide tangible social benefits to individuals in the form of improved connectedness with the community, family and friends. These benefits are difficult to monetise since they would be expected to be felt through improvements in Quality-Adjusted Life Years (QALYs) and through improvements in wellbeing.

As a result, we focus on an alternative approach to measure these benefits. Someone who is socially included is more likely to engage in leisure activities with their friends and family, such as visiting a museum or going to the cinema. We therefore argue that an increase in social inclusion could boost the leisure sector of the economy.

According to ONS data on household expenditure, individuals spends on average £31 per week on cultural and recreational activities[62]. We use the same data source to compute the weekly spend on cultural and recreational activities across different age bands. Based on the results from the FreshMinds study mentioned above, we assume that once having learnt Basic Digital Skills the proportion of people willing to spend more on recreational activities will rise by 14 percentage points[63].

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[57] Berkman, L.F. and Glass, T., 2000. Social integration, social networks, social support, and health. Social epidemiology, 1, pp.137-173.

[58] Wilkinson, R.G. and Marmot, M. eds., 2003. Social determinants of health: the solid facts. World Health Organization.

[59] Sohlman, B., 2004. A functional model of mental health as the describer of positive mental health. STAKES Research Reports 137 National Research and Development for Welfare and Health.

[60] https://www.vichealth.vic.gov.au/media-and-resources/publications/social-inclusion-as-a-determinant-of-mental-health-and-wellbeing

[61] FreshMinds for UK Online Centres, (2009) "Does the internet improve lives". UK online centres is now known as Good Things Foundation.

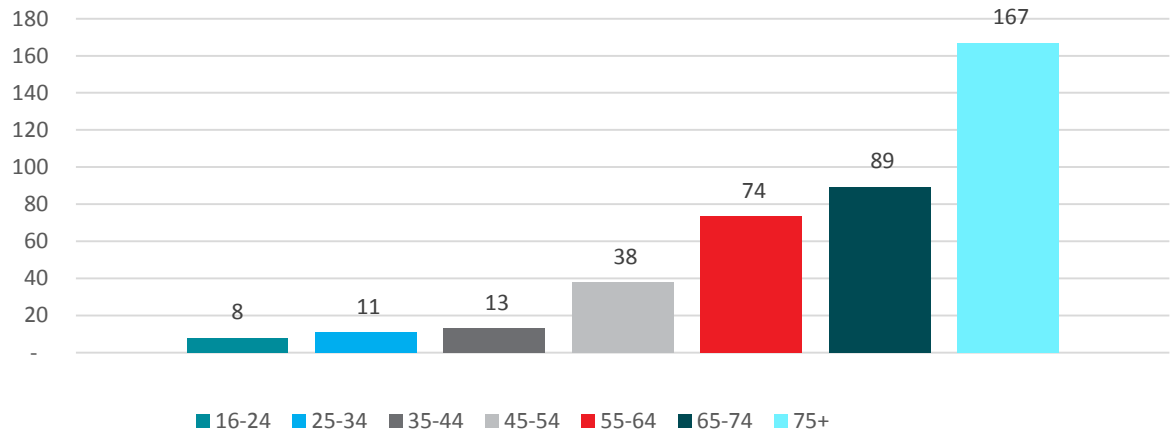
[62] ONS Family Expenditure Survey 2017

[63] The FreshMinds study suggests that the proportion of people reporting feeling connected to their local community, friends, and family after using the internet is on average, 14 percentage points higher than the proportion that indicate feeling connected before using the internet.

Following this, we assume that the individuals who feel more connected, as a result of internet communication, spend 25% more on recreational and cultural activities. This implies that once individuals get more digitally included they are willing to spend an extra £7.58[64] per week of their disposable income on the leisure sector.

The final step was to combine the results above with the number of people in the UK that need to be supported in order to learn Basic Digital Skills over the next ten years. Our analysis suggests an aggregate additional expenditure on recreational and cultural activities of £400 million by 2028. Figure 21 presents the 10 year cumulative communication benefits disaggregated by age group. As expected, people over 75 are responsible for the lion's share of the benefits of becoming more socially included through the use of Basic Digital Skills - equating to £167 million by 2028.

Figure 21: Cumulative implied value of communication benefits arising from supporting the development of Basic Digital Skills, by age, 2019-2028, £ millions



Source: Source: ONS Family expenditure survey 2017, FreshMinds Online UK Centres 2009 report, Cebr analysis

It is important to note that some of the boost in the leisure sector may be contingent on the aforementioned earnings and employability benefits being realised. However, most should be driven by individuals allocating a greater share of their existing disposable income to leisure activities once they are connected to their community via Basic Digital Skills.

4.6 Transacting with government: focus on the NHS

Digital platforms can help alleviate the demands on public services by decreasing the need for those services. For instance, the website NHS Choices allows individuals to search for official information on health topics. It includes a variety of materials and guidance on symptoms, conditions, medicines and treatments that help users make informed decisions about their health and lifestyle. By providing information to users of the website, NHS Choices aims to reduce potentially avoidable GP consultations, and thereby achieve significant cost savings by reducing demands on limited GP capacity.

The Department of Health estimated annual savings in the region of £2.9 billion from digital deployment in the NHS. The majority of these savings are expected to come from introducing more online consultations and appointment booking systems; sending appointments via e-mail; and triaging patients via video

[64] Based on average weekly household expenditure on recreation and culture activities (ONS Family Expenditure Survey 2017).

consultations. The aim is to reduce waste and encourage patients towards lower cost channels of access to healthcare[65].

However, only digitally included individuals are able to use the NHS Choices website and access the comprehensive health information it provides its users. Therefore, in this section we focus on the potential reductions in the demands on health services as a result of supporting digital skills development. Particularly, we focus on the impact of increasing digital inclusion levels on reducing the demand for avoidable GP consultations. There are two important pieces of research which we used to support our analysis:

- *Murray, Majeed, Khan, Lee and Nelson (2011) examined the extent to which the NHS Choices website has reduced the frequency with which people visited their GP for consultations[66]. They find that 29.5% of users surveyed indicated that using NHS Choices reduced the frequency with which they visited their GP. The study goes on to conclude that 29.5% of NHS Choices users would otherwise have made at least one GP appointment, had they had not accessed the website. The authors estimate that the savings made to the NHS through reduced GP consultations could total £94 million per year.*

- *The NHS Widening Digital Participation (WDP) programme in 2016 shows that 21% of learners made fewer calls or visits to their GP, with 54% of those saving at least three calls in the past three months and 40% saving at least three visits over the same period.*

- *34% of those learning Basic Digital Skills said they made fewer visits to a doctor after learning about online health resources, as a result of finding the information they needed online.*

To estimate the cumulative cost savings to NHS we followed the methodology of Murray et al., (2011), but relied on the NHS Widening Digital Participation programme data. We assumed that ensuring that all UK adults learn Basic Digital Skills will reduce the number of GP appointments per individual in the following form:

- Only 21% of the 694,000 trained per year reduce their annual GP visits; and

- From the learners that reduce their GP appointments, 40% reduce the amount of GP visits by three, and the remaining 60% reduce the number of GP visits by one.

According to the Unit Costs of Health and Social Care database, each GP visit consultation imposes a cost of £38 [67] to the NHS. This suggests that the reduction in avoidable GP consultations could save approximately £10 million within one year. By 2028, we expect the cumulative savings to the NHS from a digitally included population and hence encouraging the use of NHS Choices to amount to £100 million[68].

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[65] Government Digital Service (2012) "Digital Efficiency Report", https://www.gov.uk/government/publications/digital-efficiency-report/digital-efficiency-report

[66] Murray, J., Majeed, A., Khan, M., Lee, J and Nelson, P. (2011) "Use of the NHS Choices website for primary care consultation's: results from online and general practice surveys"

[67] Curtis, Lesley A. and Burns, Amanda (2017) Unit Costs of Health and Social Care 2017. Report number: https://doi.org/10.22024/UniKent/01.02/65559. Personal Social Services Research Unit, University of Kent, 260 pp. ISBN 9781911353041

[68] Murray et al.'s (2011) study is limited to young, healthy users of the NHS Choices website. Older users, or those with pre-existing illnesses are more likely to physically visit their GP for consultations than young, healthy users. As the number people without Basic Digital Skills is skewed towards those disabled, and in older age groups, our findings are likely to be on the conservative side. Equipping people with Basic Digital Skills which allows them to use NHS Choices may reduce the number of GP visits by more than

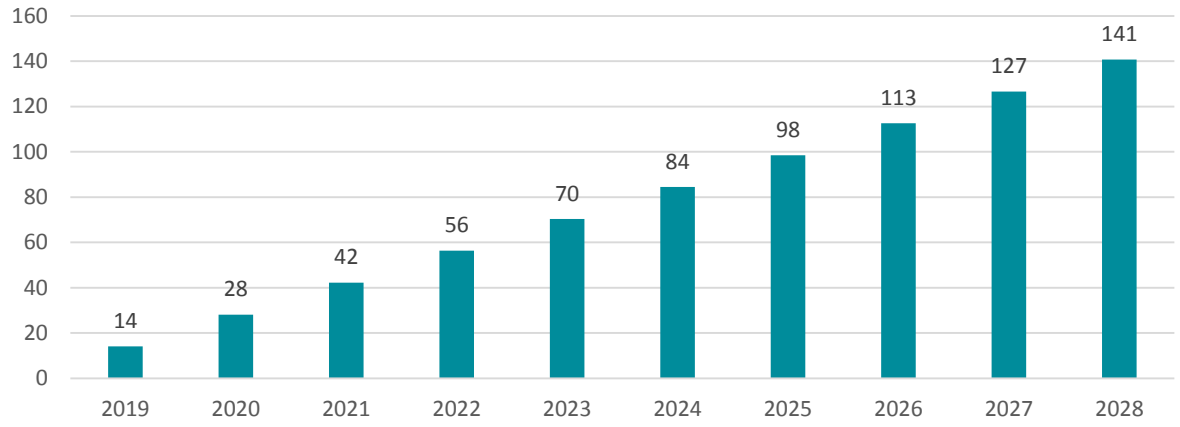
We have also incorporated another source of efficiency gains to the NHS. According to a McKinsey study, OECD countries are expected to achieve significant efficiency gains from adopting existing digital technologies into their healthcare system. Particularly, the automation and digitisation of certain primary care processes, such as E-prescriptions and online bookings, is expected to lead to efficiency savings between 1.0% and 1.1% of total healthcare expenditure[69].

We assumed that if the UK adult population is supported to learn Basic Digital Skills, we could expect the impact of digital interventions on healthcare to reach the upper bound estimate of 1.1%. Therefore, the impact of having higher digital inclusion levels is calculated as the difference between the efficiency gains at 1.0% and 1.1%. Given that the NHS Widening Digital Participation programme also found that 22% of learners have progressed to booking GP appointments online and 20% have ordered repeat prescriptions online, we took the midpoint and assumed that only 21% of the efficiency gains would be unleashed; as some of the individuals who have learnt Basic Digital Skills would still prefer to go through the offline channel.

Combining these results with the UK Healthcare expenditure data[70] suggest that, on top of the annual savings arising from a reduction in avoidable GP consultations, the NHS could save an extra £4 million a year from having the newly digitally included individuals make use of NHS online services such as E-prescription and online bookings.

Figure 22 presents the aggregated results. By 2028, we expect the cumulative savings to the NHS from having a fully digitally included population which is capable of using digital platforms, such NHS Choices, E-prescriptions and online booking, to amount to £141 million.

Figure 22: Cumulative cost savings to NHS from a reduction in GP consultation due to the use of the NHS Choices website and from the use of online booking services, £ millions, 2019-2028



Source: Murray et al. (2011), Unit Costs of Health and Social Care (2017), Cebr analysis

The cumulative savings associated with a reduction in GP consultations are smaller than our estimates in the 2015 report. Again two factors are driving these results. On one hand, the latest estimates on the costs of a GP appointment were revised downwards in 2017. As a result, the benefits associated with the

the average suggested by the young, non-disabled respondents of Murray et al.'s (2011) study. As a result, the savings to the NHS from achieving a 100% population with Basic Digital Skills could be even greater than those indicated by our findings.

[69] https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/health-systems-improving-and-sustaining-quality-through-digital-transformation?cid=digistrat-eml-alt-mip-mck-oth-1608

[70] UK Health Accounts 2016, reference tables

reduction of one GP visit will necessarily be smaller. However, this trend also reveals a success story; it would not be surprising to have the rise in digital uptake as one of the key drivers of this cost reduction. Therefore, as more people in the UK are digitally included we could experience further reductions in the costs of a GP consultation.

On the other hand, the number of people who need support to learn digital skills over the ten year appraisal period dropped from 7.9 million to 6.9 million. Once again, this is good news as it means that, compared to 2015, we currently have fewer people putting a strain on the NHS with unnecessary GP appointments.

A final point should be made here. While it is not unreasonable to consider these benefits as potential net spending reductions by the government on public health services, these savings would more likely need to be viewed within the context of a fixed envelope of public spending on health. This implies that the savings achieved here will most likely lead to a redirection of resources to potentially more productive uses of public health spending.

4.7 Digital efficiency savings: increase in the digital take-up of online government transactions

Five years have passed since the Government launched its 'digital by default' initiative which aimed at progressively increasing the number of government services available online. Significant progress has been made, as the UN has recognised the UK as the world leader in digital government[71].

However, more can be done to unleash the expected yearly savings associated with digitising central government. As described in our 2015 report, the move towards online services is expected to generate efficiencies by reducing staff time involved in processing transactions online, as opposed to offline; estates and accommodation; postage, packaging and materials. The total savings are estimated to be in the range of £1.7 billion to £1.8 billion every year[72].

It is important to note that these benefits have not been directly included in the cost-benefit analysis, since the savings presented in the Digital Efficiency Report have been computed in a way that is not conditional on investing in digital inclusion. For instance, the Digital Efficiency Report makes clear that the estimated savings do not account for the level of investment that may be needed to create or redesign digital services. This means that these savings do not require ensuring that all UK adults learn Basic Digital Skills

This is not to say that the support from the Government to invest in a Basic Digital Skills support programme would not accelerate the benefits of the Government's digital efficiency strategy, and even increase the size of the savings related to the Government's digital efficiency strategy. The Digital Efficiency report recognizes exactly that: "More digital skills across government (…) will lead to even greater potential for digital transactions to save the public money and improve their user experience" [73] . Similarly, the 2017 Digital Strategy reinstates the benefits of supporting a digitally included population. One of the pillars of this strategy is to enhance the government digital services, with the overall aim to increase the demand for these online services. This objective closely interacts with another pillar of the strategy, which focus on digital skills and inclusion.

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[71] https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2016

[72] Government Digital Service (2012) "Digital Efficiency Report", https://www.gov.uk/government/publications/digital-efficiency-report/digital-efficiency-report

[73] Government Digital Service (2012) "Digital Efficiency Report", https://www.gov.uk/government/publications/digital-efficiency-report/digital-efficiency-report

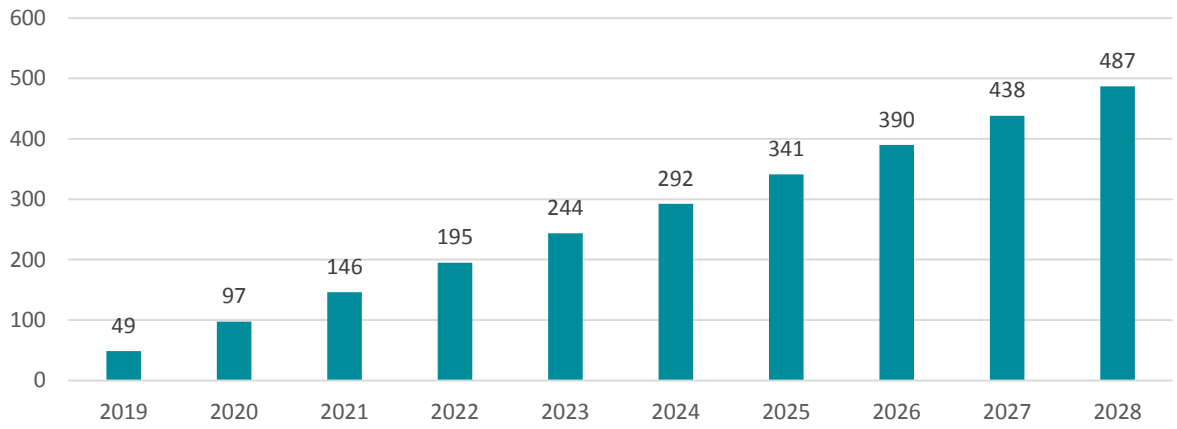
We have therefore computed the likely increases in government savings associated with ensuring that all UK adults learn Basic Digital Skills. The £1.7 billion to £1.8 billion annual savings assumes an 82% digital take-up, which was based on research that found that 82% of the UK adult population is online and able to use straightforward and convenient digital services[74]. The Digital Efficiency report also produced other estimates of savings based on higher levels of digital take-up. Particularly, the expected yearly savings raise to an average of £2.2 billion, if digital take-up increases to 95%.

We assumed that if the digitally excluded individuals were to learn Basic Digital Skills, we could expect a digital take-up of 95% in 2028. Therefore, the impact of supporting the development of digital skills is calculated as the difference between the annual savings when digital take-up is 82% and the annual savings when digital take-up reaches 95%.

Since only 694,000 individuals need to be supported each year, the digital take-up will only reach 95% in 2028. However, in the period between 2019 and 2028 we will experience a yearly increase in the number of digitally included people who can use government online services due to the learning digital skills. Consequently, we assumed that each year there will be a boost to government savings in line with the increase in the number of digitally included people.

Our estimates suggest that supporting digital inclusion could boost the government annual savings from digitisation by an average of £49 million (2017 prices). By 2028, we expect the cumulative boost in government savings from ensuring that all UK adults learn Basic Digital Skills, and hence encouraging the use of online government services, to amount to £487 million.

Figure 23: Cumulative boost in government savings from a higher digital take-up of online government transactions from increasing the levels of digital inclusion in the UK, £ millions, 2019-2028



Source: Digital Efficiency Report (2012), Cebr analysis

An important caveat needs to be mentioned. The annual savings presented in the Digital Efficiency report do not account for the level of investment that may be needed to create or redesign government digital services. However, the transitional costs of digitising services do not affect our results, since we are estimating the extra boost in savings that would arise solely from increasing the level of digital inclusion in the UK. As a result, only the costs associated with supporting the digital skills learning process need to be incorporated in our cost-benefit analysis. These costs were explored in Section 3 of this report.

[74] GDS 'Digital Landscape Research', https://www.gov.uk/government/publications/digital-landscape-research/digital-landscape-research

4.8 Corporate benefits: reduction in the number of skills shortages vacancies

A recent trend in the UK has been the increase in the number of vacancies companies are not able to fill due to skills shortages. According to the latest UK Commission for Employment and Skills (UKCES) Employers skills survey, in 2015 23% of all vacancies were skills shortages vacancies. This contrasts with the 2011 results in which it is estimated that only 16% of all vacancies were skills shortages related[75].

As the UK economy experiences one of the lowest unemployment rates ever, skills shortages vacancies are a substantial challenge for employers and can severely hamper their growth opportunities. The UKCES skills survey estimated that in 2015 6% of the UK employers had at least one skill shortage vacancy.

This trend can pose considerable costs to firms as they need to spend time and resources in finding applicants with the relevant skills for the advertised role. In some cases, companies might even have to hire workers with skills below par. Consequently, businesses may find themselves allocating a higher share of their budget to formally support the development of these skills. However, budget constraints might prevent most of these companies from investing in such formal training. This suggests that some firms will have to run their day-to-day operations with staff that have significant skills gaps. Incidentally, the UKCES 2015 skills survey found that 14% of companies have staff that are not fully proficient. This is another source of costs, as these skills gaps imply that workers are not able to deliver the same output as a fully skilled worker potentially could.

In this section, we estimate the corporate benefits of having all UK adults learn Basic Digital Skills. These benefits are defined as the productivity boost companies can achieve by being able to fill skills shortages vacancies related to digital skills. The latest ONS job vacancy data suggests that the UK has 828,000 job vacancies. We combine these data with the UKCES Employers Skills survey to estimate the number of vacancies in the UK that are associated with digital skills shortages. To do so, we used computer literacy/ basic IT skills as a proxy for Basic Digital Skills. In 2018, we estimate that there were 42,000 Basic Digital Skills shortages vacancies in the UK.

Out of all individuals who will get Basic Digital Skills support each year, we assumed that 5.5% would decide to actively seek a new job that makes use of the newly learned Basic Digital Skills[76]. This suggests that the pool of people able to fill digital skills shortages vacancies increases each year as the UK populations gets more digitally included. We have also attempted to capture a certain degree of labour market frictions in our analysis. It would be unreasonable to assume that all of the individuals above are able to fill all the existing digital skills shortages vacancies immediately, especially given the hard-to-fill nature of these vacancies. As a result, we assumed a more flexible, gradual vacancy-filling behaviour which implies that there is a lag between the time the newly digitally included individuals learn Basic Digital Skills and the time when they fill digital skills shortages vacancies. Empirical estimates suggest that in the UK labour market, 75% of individuals who are actively searching for a job in a given year and have not yet found one will fill a vacancy[77].

The final step of our analysis is to calculate the benefits for a company of filling these hard-to-fill vacancies. A standard assumption in economic theory is that a worker's contribution to the company can be

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75 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/704104/Employer_Skills_Survey_2015_UK_Results-Amended-2018.pdf

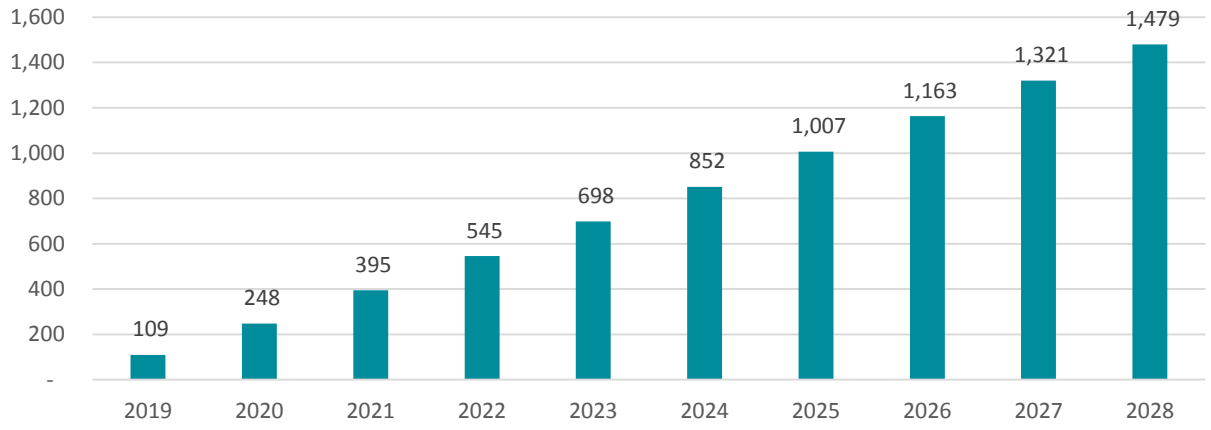
76 This is based on the PWC digital inclusion report mentioned in Section 4.3 above.

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

measured by their labour productivity. Therefore, the benefit for a company of filling Basic Digital Skills shortages vacancies is measured as the boost in productivity that the company will experience from having a fully digital-proficient staff. The metric used to measure this boost consists of the differential between the wages of skilled workers and the wages of low skilled workers in the UK. Based on our research, we assumed a conservative differential of 50%.

By 2028, we expect the cumulative productivity boost to companies from ensuring that all UK adults learn Basic Digital Skills, and hence reducing digital skills shortages vacancies, to amount to £1.5 billion.

Figure 24: Cumulative corporate benefits from a reduction in digital skills shortages vacancies by increasing the levels of digital inclusion in the UK, £ millions, 2019-2028



Source: PWC Digital Inclusion report, ONS, Cebr analysis

4.9 Aggregate benefits

In Section 4 we explored the eight channels through which the economic benefits of supporting digital inclusion are most likely to arise. Table 5 presents a summary of our results. Once the benefits across these eight channels are aggregated, we estimate that boosting the digital inclusion levels of 694,000 individuals each year, until 2028, would lead to a cumulative benefit of £5.5 billion.

Table 5: Cumulative aggregate economic benefits, arising from supporting digital inclusion, 2019 – 2028 (£'s millions)

	Time savings	Earnings benefit	Employment benefits	Transaction benefits	Communication benefits	NHS efficiency savings	Digital efficiency savings	Corporate benefits	Total benefits
2019	99	56	29	106	40	14	49	109	**503**
2020	200	113	58	213	80	28	97	248	**1,037**
2021	301	170	88	319	120	42	146	395	**1,581**
2022	403	227	119	425	160	56	195	545	**2,130**
2023	507	284	150	532	200	70	244	698	**2,684**
2024	612	341	182	638	240	84	292	852	**3,242**
2025	719	399	215	744	280	98	341	1,007	**3,803**
2026	828	456	248	851	320	113	390	1,163	**4,369**
2027	939	513	283	957	360	127	438	1,321	**4,939**
2028	1,053	571	313	1,063	400	141	487	1,479	**5,508**

Source: Cebr analysis

Below we present a brief description of what each benefit entails and means to the UK economy.

- **Time savings:** Undertaking financial and government transactions online can bring about considerable time savings when compared to having to visit a bank branch, or local council office. We estimate the value of time saved by 2028 to total £1.1 billion.
- **Earnings benefit:** Learning Basic Digital Skills is expected to increase the incomes of individuals, as they become more productive and are able to get into roles that are more high-skilled. The earnings benefit also takes into account the rise in employer and employee NICs, and income tax receipts that the government gains, from individuals with higher incomes. By 2028, we estimate the total earnings benefit to the economy to equate to £571 million.
- **Employment benefits:** Basic Digital Skills support can increase the likelihood of unemployed, or economically inactive individuals, to enter the workforce. The move into employment will boost individuals' incomes and, as a result, increase employees' and employers' NICs, as well as income tax receipts to the government. We estimate the total employability benefits to amount to £313 million by 2028.
- **Transaction benefits:** Learning digital skills gives individuals the opportunity to shop online, allowing for considerable cost savings. We estimate the cost savings that can be made by individuals from using cashback and discount websites to amount to £1.1 billion by 2028.
- **Communication benefits:** Digital inclusion implies that individuals can use online tools to keep in touch with their friends, family and local community, thereby feeling more connected. We assume that the reduction in social isolation will lead individuals to allocate a higher share of their disposable income to recreational and culture activities. We estimate the aggregate additional expenditure on recreational and cultural activities to amount to £400 million by 2028.
- **NHS savings:** Individuals who have learned Basic Digital Skills can take advantage of the NHS Choices website, E-prescriptions and online bookings systems. This will lead to a reduction in the number of

avoidable GP visits, as well as a reduction in the costs of providing offline booking services. We estimate the cost savings to the NHS to total £141 million by 2028.

- **Digital efficiency savings:** Supporting the development of a digitally included population can foster the growth in use of online government services. This will lead to a reduction in the use of offline services which are more costly to the government to provide. We estimate the boost in savings to the government associated with an increase in digital take-up to reach £487 million by 2028.
- **Corporate benefits:** Digital inclusion can help companies fill their digital skills shortages vacancies. This will lead to productivity gains for firms that see their output increase once their staff are fully digitally proficient. We estimate the corporate benefits from a reduction in digital skills shortages vacancies to be £1.5 billion by 2028.

5 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 in order to assess if this investment is worthwhile from the perspective of society and Government.

5.1 Methodological approach

Section 3 and Section 4 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 694,000 people every year between 2019 and 2028.

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.[78]

Similar to the 2015 report, 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 0. 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.*

[78] 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.

5.2 Results of the analysis

Table 6 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 £21.9 billion (2017 prices), and the CBR to be 14.8.[79]

Table 6: Summary of the cost and benefits of the proposed investment programme, £ million (2017 prices)

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	**Total (present value)**
		2019	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	
Investment costs	**Operating cost**	-142	-142	-142	-142	-142	-142	-142	-142	-142	-142	-1,178
	Capital cost	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-39
User costs	**User cost of digital devices**	-69	-61	-54	-48	-42	-38	-36	-33	-29	-26	-373
User benefits	**Net earnings benefits**	34	68	102	137	171	205	240	274	309	343	1,485
	Net employment benefits	21	42	64	86	109	132	155	179	203	228	960
	Transaction benefits	106	213	319	425	532	638	744	851	957	1,063	4,614
	Communication benefits	40	80	120	160	200	240	280	320	360	400	1,736
	Time savings	99	200	301	403	507	612	719	828	939	1,053	4,459
Gov. benefits	**NHS cost savings**	14	28	42	56	70	84	98	113	127	141	610
	Income tax and NI receipts, and JSA benefit reduction	30	61	92	123	155	186	219	251	284	313	1,350
Gov. and user benefits	**Digital efficiency savings**	49	97	146	195	244	292	341	390	438	487	2,114
Corporate benefits	**Reduction in digital skills shortages vacancies**	109	248	395	545	698	852	1,007	1,163	1,321	1,479	6,141
	Discount factor @ 3.5%	0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	
	Present value	**278**	**774**	**1,246**	**1,687**	**2,102**	**2,487**	**2,847**	**3,182**	**3,495**	**3,782**	**21,879**

Source: Cebr analysis

[79] 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 "2028". 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 Conclusions

The evidence presented in this report supports the view that there are substantial gains for individuals and for society as a whole from ensuring that all UK adults learn Basic Digital Skills. We estimate a benefit of almost £15 for every £1 invested.

While the 2018 results suggest that there was an increase in the NPV and CBR of this investment, compared to the 2015 results, it is important to bear in mind that we have included two new channels that substantially increase the benefits of supporting digital inclusion. Therefore, when comparing the two sets of results the key takeaway is that ensuring that all UK adults learn Basic Digital Skills can bring benefits to everyone in society.

Furthermore, supporting the development of digital skills is essential to ensure that the workforce is prepared for the rapid development of technologies and the advent of digitisation. This is a challenge that has been recognised in the UK. The main premise of a House of Commons Science and Technology Committee[80] report is that the UK is facing a digital skills crisis. The report estimated that the digital skills gap is costing the UK economy £63 billion a year in the lost potential for additional GDP. Supporting digital inclusion by ensuring that all adults learn Basic Digital Skills could help erase this cost.

The boost in social inclusion that can arise from investing in Basic Digital Skills is especially relevant in today's society. An increasing number of daily tasks or job responsibilities require digital skills and those that haven't learnt Basic Digital Skills end up being socially marginalised. Supporting individuals who lack digital skills throughout their learning process can help to mitigate these marginalisation trends.

Particularly, the great majority of today's communications is done via some form of digital device. If individuals are not able to make use of these technologies to communicate they can be completely cut off from society. Similarly, at work the ability to be promoted or to find better roles is hampered if individuals do not have the digital skills to fulfil the requirements of these roles. Low professional mobility will have an impact on the lifetime earnings of individuals, which can decrease the quality of their life and impact their self-esteem and confidence. In turn, these can affect workers' performance and their desire to engage in social events, creating a cycle that leaves digitally excluded individuals even more marginalised. Ensuring that all UK adults learn Basic Digital Skills can help to put a stop to this vicious cycle.

[80] https://publications.parliament.uk/pa/cm201617/cmselect/cmsctech/270/270.pdf

Appendix

In this section we present the results of our cost-benefit analysis of investing in Basic Digital Skills under a scenario that more accurately reflects the present term structure of the interest rates in the UK. As described in Section 5, one of the most important steps of our analysis is to discount the cash flows associated with this investment. We used a standard discount rate of 3.5%, as stipulated in HM Treasury's Green Book guidance on appraisal and evaluation in central government. However, since real interest rates are well below the zero, the 3.5% discount rate may not appropriately reflect current investment conditions in the UK.

We have therefore computed the NPV and CBR using Bank of England data on the 10 year real yield curve. Table 7 presents our results. When all costs and benefits to learners, businesses and the Government are taken into account, and a discount rate of -1.70% is applied, we estimate the NPV for the 10 year investment to be £31.7 billion (2017 prices), and the CBR to be 16.2.[81]

Table 7: Summary of the cost and benefits of the proposed investment programme, £ million (2017 prices)

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	**Total (present value)**
		2019	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	
Investment costs	**Operating cost**	-142	-142	-142	-142	-142	-142	-142	-142	-142	-142	-1,559
	Capital cost	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-51
User costs	**User cost of digital devices**	-69	-61	-54	-48	-42	-38	-36	-33	-29	-26	-472
User benefits	**Net earnings benefits**	34	68	102	137	171	205	240	274	309	343	2,126
	Net employment benefits	21	42	64	86	109	132	155	179	203	228	1,377
	Transaction benefits	106	213	319	425	532	638	744	851	957	1,063	6,601
	Communication benefits	40	80	120	160	200	240	280	320	360	400	2,484
	Time savings	99	200	301	403	507	612	719	828	939	1,053	6,392
Gov. benefits	**NHS cost savings**	14	28	42	56	70	84	98	113	127	141	873

[81] 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 "2028". 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.

	Income tax and NI receipts, and JSA benefit reduction	30	61	92	123	155	186	219	251	284	313	1,934
Gov. and user benefits	**Digital efficiency savings**	49	97	146	195	244	292	341	390	438	487	3,024
Corporate benefits	**Reduction in digital skills shortages vacancies**	109	248	395	545	698	852	1,007	1,163	1,321	1,479	8,838
	Discount factor @ -1.7%	1.02	1.03	1.05	1.07	1.09	1.11	1.13	1.15	1.17	1.19	
	Present value	**292**	**858**	**1,454**	**2,074**	**2,720**	**3,388**	**4,083**	**4,806**	**5,558**	**6,334**	**31,567**

Source: Cebr analysis

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