USING DIGITAL SKILLS TO TAKE ADVANTAGE OF AI

How to identify what digital skills are needed

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HOW TO IDENTIFY WHAT DIGITAL SKILLS ARE NEEDED

DIGITALISATION CHANGES THE SKILLS REQUIRED TO THRIVE AT WORK

The evolution of digital technology, including the development and application of AI systems, is one of the factors changing the demand for skills in the labour market. Digital skills are required in at least 82% of online advertised openings across the UK. Jobs demanding digital skills pay 29% more than those that don't, suggesting a relative scarcity of such skills in the economy.[1]

Indeed, around 40% of UK workers do not have the correct qualifications for their jobs. The Industrial Strategy Council estimates that an additional 7m people — 20% of the workforce — will be significantly underskilled for their jobs by 2030.[2]

Digitalisation leads to new digitally intensive jobs, and, because of the benefits of digital technology, to faster growth of existing digital occupations compared to others. These occupations include:

- Jobs that involve producing digital technology and its applications, from machine-learning engineers and data scientists to web developers; and
- Jobs that increasingly use digital technology, from marketing specialists to warehouse workers.

This distinction is important because when we think of digital skills, the first thing that comes to mind might be the ability to

[1] Burning Glass Technologies (2019), "No Longer Optional: Employer Demand for Digital Skills", report prepared for the Department of Digital, Culture, Media and Sport, available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/807830/No_Longer_Optional_Employer_Demand_for_Digital_Skills.pdf

[2] https://industrialstrategycouncil.org/sites/default/files/UK%20Skills%20Mismatch%202030%20-%20Research%20Paper.pdf

EXEC SUMMARY

The increasing digitalisation of economic activity, including the adoption of Artificial Intelligence (AI), is changing the skills required to succeed across a broad range of industries and occupations. In this article, we report insights from our analysis of how to identify what digital skills are needed. It shows that working in digitally intensive jobs requires more than technical digital skills, such as coding. Effective investment in digital skills is likely to include providing employees with transferable skills – for example, supporting their ability to work in information-rich environments. Digital technology does not only create requirements for new skills – it could also help deliver better targeted, more effective training at lower cost. However, private sector employers may under-invest in transferable skills, and Government could provide carefully designed incentives to help overcome this challenge.

program in a particular coding language; or, when it comes specifically to AI, the ability to build one of the recommendation systems that are part of what we expect to see when we use an online platform.

The focus of this article is not on the high-level technical skills used in digital production, which are extremely important but are limited to a relatively small part of the labour market. Rather we look at how to define digital skills as well as challenges facing both the private and public sectors in providing these skills.

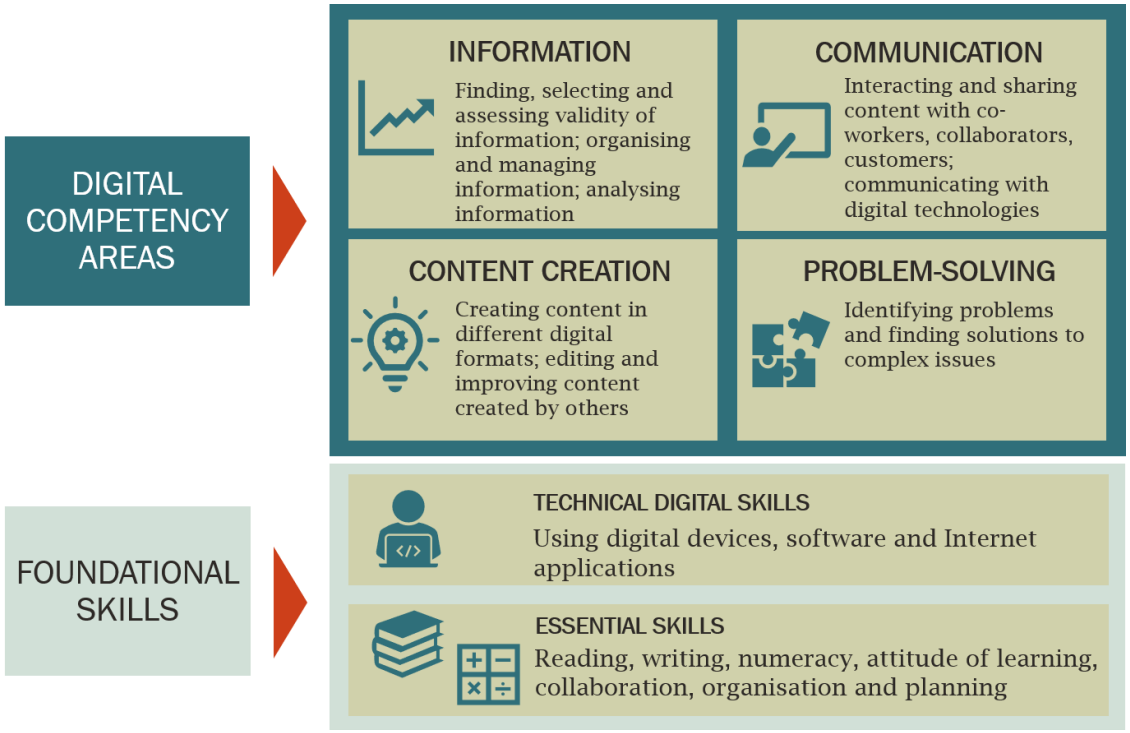
USING DATA TO IDENTIFY THE SKILLS NEEDED IN DIGITAL JOBS

Frontier worked on a project to create and test empirically a framework for a large multinational interested in providing digital skills training in the UK, the US, Germany and other advanced economies.

We found that a useful definition of digital skills should not be limited to what we would call technical skills, such as coding or the ability to use a particular software.

Indeed, workers in digitally intensive occupations, i.e. who regularly use computers or other digital devices, tend to need a higher level of skills in four competency areas: information, communication, content creation and problem-solving.

FIGURE 1 DIGITAL SKILLS FRAMEWORK

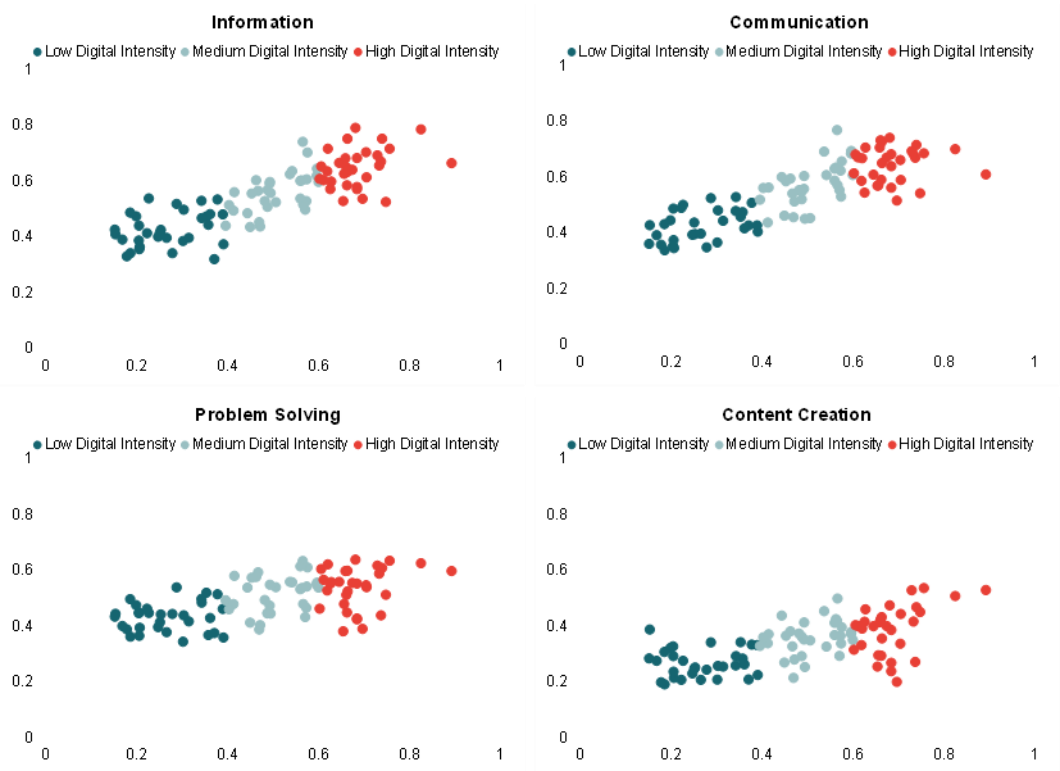


Source: Frontier Economics analysis of literature on digital skills frameworks

For example, human resource (HR) specialists (corporate recruiters, HR analysts and coordinators) are an occupation category with above average digital intensity[3]. They don't need to be able to code, but they routinely use a variety of software, from Enterprise Resource Planning to database management systems and business intelligence applications. As a result, HR specialists are in the top 10% of jobs ranked by the information skills required.

We validated this framework by analysing detailed data on skills requirements in more than 900 occupations (i.e. standardised job categories). The figure below shows that the greater the digital intensity (ordered from left to right in each chart), the higher the requirement for proficiency in skills pertaining to each of the four digital competency areas.

FIGURE 2 RELATION BETWEEN DIGITAL INTENSITY AND COMPETENCY AREAS



*Source: Frontier Economics analysis of the Occupation Information Network (O*NET) database (United States*

Within competency areas, workers use both general, transferable skills and job-specific skills. Someone who has not worked in a digital environment before would likely need to acquire both sets of skills to perform well in a digitally intensive job. Someone who already has such experience may be able to move to another digital job more easily, having already acquired the general skills required across the four competency areas.

[3] As measured in the Occupational Information Network Database.

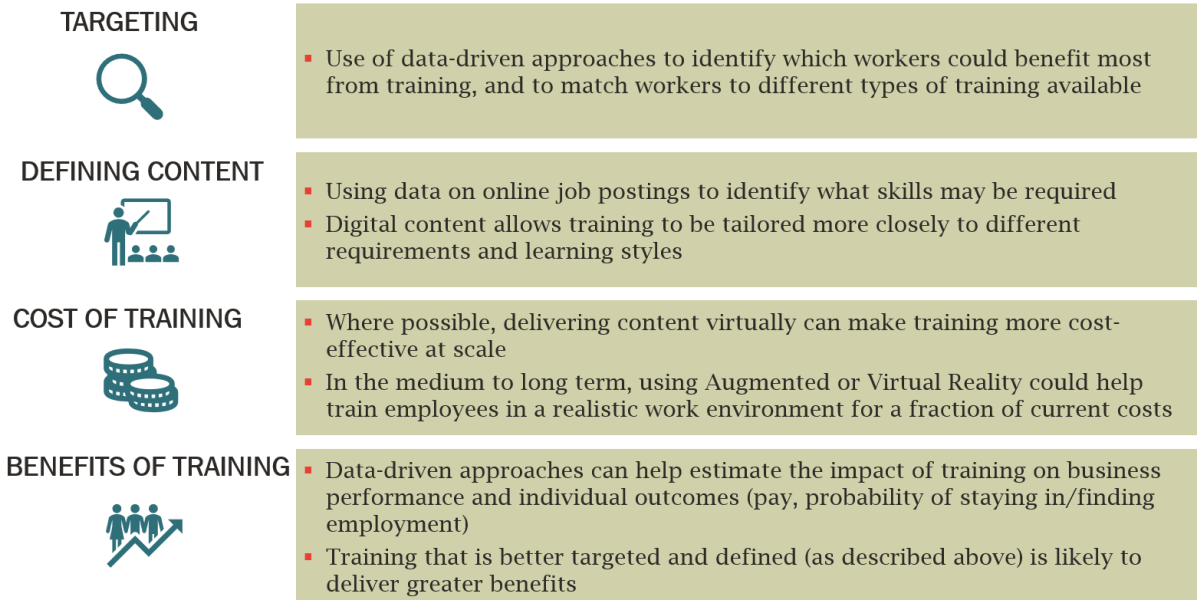
DIGITAL TECHNOLOGY CAN HELP INVEST EFFECTIVELY IN TRAINING

There are a number of design, monitoring and evaluation issues to be considered to make sure that investment in training is worthwhile. These apply to both private and public sector provision of training:

- Whom should training target?
- What is the content being offered?
- What is the cost?
- What is the likely benefit for workers and the company?

The use of data and digital technology (including AI) has the potential to help in each of these areas, as described in the figure below. These applications can be relevant for a wide range of organisations, from businesses aiming to train their own workers to private and public sectors training providers.

FIGURE 3 CATEGORISATION OF THE ROLE OF DIGITAL TECHNOLOGY IN TRAINING



Source: Frontier Economics

Businesses that train their workforce in-house will generally have a relatively good sense of what skills they need, at least in the short term. For them, digital is likely to help most by increasing the return on investment in skills and/or helping demonstrate that return.

Significantly, digital training can be less costly to deliver and easier to scale. It also opens up opportunities to personalise the content and to experiment - learning what works and what doesn't and implementing the best solutions at scale.

This can mean designing training programmes and tools in a way that maximises engagement, i.e. ensuring that workers actually attend and complete training sessions. More important, although harder, is testing

what content actually leads to increased productivity and improves the wellbeing of workers. Measuring individual productivity is challenging but, again, innovative approaches could be trialled while taking care not to veer from evaluation into invasive surveillance.

In a recent project, we applied quantitative impact evaluation techniques to an online digital skills training programme offered by a large multinational. We found that it had a positive effect on the employment opportunities of those who went through the training. However, the impact was not uniform across countries, suggesting that different approaches may be needed and that there's scope to learn from others' experiences about what works and what does not.

Compared to private sector employers, public sector training providers may benefit even more from the increasing availability of data on skills needs. For example, data from online job postings can be analysed to investigate how skills requirements are changing. At Frontier, we're currently using these data, working with the Geospatial Commission, to better understand what geospatial skills are required on the labour market and where (geographically and in terms of industries) these skills are in demand.[4]

Like private sector employers, Government and public sector organisations can also use digital technology to better target training interventions and to deliver these more effectively. The scale of some organisations (think of the NHS for example) means there is potential to experiment and generate useful data about what works. The experience of digital innovation in health can be informative here. Projects like the NHS England Test Beds programme, which tested new combinations of digital technologies and models of care in real-world clinical settings, can be very useful to understand what is effective.

THE RATIONALE FOR WELL-TARGETED INCENTIVES

Businesses can and do invest in training. Two-thirds of UK employers provided training for their staff in 2017, the latest year for which data from the Employer Skills Survey is available.[5]

However, there is a clear role for government intervention: first, to provide training to those who are not in work and second, because employers may invest less in training than is socially optimal. That may be because they "lose" part of the benefits of their investment when employees leave the company; another possible reason is that returns on training may be hard to assess. Both considerations apply particularly to investment in general skills.

It may be especially challenging for businesses to invest sufficiently in skills that are relatively general and transferable, rather than very job-specific. As discussed earlier, many people may benefit from acquiring both sets of skills in order to take up a digital job.

- In this context, carefully designed incentives for businesses to provide training could be useful to boost the skills of the UK workforce. Like many other countries, the UK offers incentives and

[4] We define geospatial skills as the skills required to work with data that include geographic information (geospatial data). Geospatial data may include for example the location of a customer, or the boundaries of a Local Authority. The Geospatial Commission is an expert committee that sets the UK's geospatial strategy and promotes the best use of geospatial data.

[5] IFF Research, Employer Skills Survey 2017, report prepared for the Department for Education, available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/746493/ESS_2017_UK_Report_Controlled_v06.00.pdf

subsidies to invest in Research & Development but it has no comparable policies for investment in human capital.[6]

- The case for such incentives needs to be carefully assessed, but it may be particularly strong in the case of digital skills training. If this were to include a transferable component (e.g. the ability to process information) and a job-specific element (e.g. using specialist software to manage job applications), well-designed incentives could make businesses more willing to provide general training. That would increase the effectiveness of job-specific training and generate a "crowding in" effect.[7]

To conclude, the proliferation of digital technology and new analytical techniques such as machine-learning and AI systems is transforming the way we work and what skills are most valued. Many people who have traditionally held non-digital jobs or have been at the margin of the labour market may benefit from acquiring new skills.

At the same time, digital technology may create opportunities to provide training that is better targeted, better defined, less costly and ultimately more effective. But technology is not a panacea. Careful evaluation of what works and what returns can be expected from investing in skills is needed to make strides towards greater business productivity and worker wellbeing. Public policy can support and catalyse this process through pilot interventions and by considering carefully designed incentives for private investment in human capital.

[6] See for example http://cver.lse.ac.uk/textonly/cver/pubs/cverbrf007.pdf

[7] García-Quevedo, J. (2004) provides a literature review showing that a majority of reviewed studies found crowding-in effects from public support to private innovation. García-Quevedo, J. (2004) Do Public Subsidies Complement Business R&D? A Meta-Analysis of the Econometric Evidence. Kyklos 57, 87-102

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