

# Data literacy and the UK government

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## About

This report, published in April 2022, draws upon previous ODI work – including our own Data Skills Framework – as well as desk research and interviews with key stakeholders to understand the UK government’s current approach to data literacy.

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If you want to provide feedback or get in touch, contact us at [policy@theodi.org](mailto:policy@theodi.org)



This is work in progress. It is likely to be updated as we continue our work. Keep an eye out for updates!



How can it be improved? We welcome suggestions from the community in the comments.

# Summary

One of the six points in the [ODI's manifesto](#) for open and trustworthy data ecosystems and a world where data works for everyone is data capability: **'Everyone must have the opportunity to understand how data can be and is being used. We need data literacy for all, data science skills, and experience using data to help solve problems'**.

This paper aims to map the UK government's activity on 'data literacy', as part of the ODI's work in support of the [UK National Data Strategy](#) (NDS). The ODI understands '[data literacy](#)' as 'the ability to think critically about data in different contexts and examine the impact of different approaches when collecting, using and sharing data and information'. It goes beyond the technical skills involved in working with data.

The UK government recognises the importance of data skills – 'for a data-driven economy and data-rich lives' – by making it [one of the four pillars of the NDS](#). Within this, it says that 'foundational data literacy will be required by all'.

How the government approaches 'data literacy' for its own workforce, in its attempts to increase the use of data in policymaking and service delivery, engages Mission 3 of the NDS – 'transforming government's use of data to drive efficiency and improve public services'. Its policies and initiatives for the wider population engage Mission 1, on 'unlocking the value of data across the economy'. But the government's work on Mission 3 will also have an impact on Mission 1, as we argued in [our earlier report](#) mapping the organisations responsible for data across the UK government. [What the government does internally can also affect the wider economy and society](#), particularly given its role in leading by example, providing support (eg in publishing resources), and collaborating with others. As a major employer in its own right – public sector employment accounts for [more than a sixth of all employment in the UK](#) – efforts to upskill its own workforce may have an impact on other sectors, as it shapes the employment market and workers move in and out of the public sector.

This paper, based on desk research and interviews with key stakeholders, attempts to understand how the UK government is approaching data literacy, for example by looking at how government (and others) think about 'data literacy' and how this is reflected in initiatives to build data capability, both within the public sector and for the wider population.

It finds that:

1. While everyone – in documents from the NDS to [the AI Roadmap](#), and in conversations with key stakeholders – agrees that data literacy for all is important, government has no consistent definition of ‘data literacy’ (reflecting the difficulty in settling on a definition found in the wider literature). ‘Data literacy’ is often mentioned without being defined or developed further. And it is quickly elided with more specialist, technical data skills.<sup>1</sup> There are several different strategies, documents and training offers, but there is no obvious overarching framework for thinking about data literacy. And these initiatives appear to ignore the government’s own earlier work, such as its [framework for essential digital skills](#). The lack of definitions, combined with the multiple spheres and subjects ‘data literacy’ spans, can make measuring data literacy a challenge.
2. There are also other overlapping types of literacy – digital literacy, media literacy, AI literacy, statistical literacy, tech literacy, information literacy, analytical literacy, evaluation literacy and mathematical literacy all feature in government documents and discussion alongside numeracy and financial literacy. Data literacy is foundational for many of these. The NDS recognises both the overarching problem with definitions, and these overlapping or ‘parallel’ skills, but government has not yet delivered its promised definition of data literacy, or mapped out the distinctions between these skills and their importance for the wider economy.
3. In 2021, [we attempted to map the organisations responsible for ‘data’ in government](#), because of our documented concern that responsibility was fragmented across multiple bodies, work was being duplicated, and different initiatives were not well aligned with each other. With several different organisations responsible for ‘data literacy’ in government, and the lack of a consistent definition across government, there is still a risk of fragmentation, duplication and contradiction, and of not being able to work out to what extent this is the case.

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<sup>1</sup> We are conscious that our own framework is called a [Data Skills Framework](#), even though it includes more strategic and critical skills that we describe as ‘literacy’ as well as more technical skills. For more on the framework, see chapter 1.

4. The government organisations with particular responsibility for data literacy in the public sector appear to be making good progress and seem well aware of the work that others are doing. There has been a welcome focus on improving data capability within the civil service, with [the Government Skills and Curriculum Unit](#) (GSCU) and the various data-related functions and professions (particularly the [Analysis Function](#) and [Government Statistical Service](#)) producing and consolidating lots of training resources. In government documents and in interviews, the [Data Masterclasses](#) (originally for senior leaders, but now offered to others), originated by the GSCU, then run jointly by 10DS (the Number 10 Data Science team) and the [Office for National Statistics \(ONS\) Data Science Campus](#) and taken over by the latter, feature prominently as a good example of teaching data literacy. However, it may still be possible to better collect the wealth of material under a ‘data literacy’ heading and understand what different organisations are doing on data literacy. And despite the increasing amount of data literacy support available to people inside government, much of it is provided through data-oriented professions and functions, and some stakeholders we spoke to were conscious that more could be offered at more general, basic and junior levels
  
5. Despite the government’s recognition of the importance of data literacy for the wider population, there appears to be less activity and less alignment, particularly with what the government is doing internally. The [Department for Digital, Culture, Media and Sport](#) (DCMS), through the NDS, is a key player, working with other organisations including the [Department for Education](#) (DfE) and the [Office for Students](#) (OfS) on specific projects. The [Information Commissioner’s Office](#) (ICO) (as the body responsible for regulating data rights, including data protection) and increasingly [Ofcom](#) (responsible for overseeing a great deal of [the Online Safety Bill](#)) are likely to play a role. But this appears less developed and less coherent than the government’s internal offering. And, despite some big initiatives like the [Online Media Literacy Strategy](#), most initiatives focus on the individual as employee, with an emphasis on the benefits to the workforce, rather on the individual as citizen and the benefits to them within society – the ‘data-driven economy’ rather than the ‘data-rich lives’ mentioned in the NDS.

There is some promising work going on, particularly in upskilling public servants. But a lack of consistent definition of 'data literacy' and a lack of alignment, especially between initiatives focused on the public sector workforce and those focused on the public more generally, mean that there is still work to do.

Key issues that need to be addressed include:

- **The lack of definitions around 'data literacy' and the other, overlapping types of 'literacy'.** Something like the [ODI Data Skills Framework](#) (with its hexagons of different topics, see figure 1 on page 12) and the forthcoming ODI Levels of Data Literacy (see figure 2 on page 14) could help give some shape to this, as could a guide to how the various other overlapping literacies relate to foundational data literacy and how government thinks they all intersect.
- **The risk of fragmentation, duplication and lack of awareness of different work across government.** Consistent definitions could mitigate this, and there has been excellent work within government to pull together different resources from across different professions and functions – but making such resources even easier to find and access – perhaps grouped under a 'data literacy' heading – will make them easier for people to use and integrate into their own training plans.
- **The particular disconnection between government's internal initiatives and its public-facing data literacy work.** The resources and training offered inside government feels more extensive than many of the current external initiatives. Increased openness about the materials available, within government and to the wider population, could be of real benefit and support government's ambitions for data literacy for the wider population and workforce.

# Background

In the 21<sup>st</sup> Century, every organisation is a data organisation, and should be thinking about how it uses data and its role in wider data ecosystems.

Similarly, every role is now a data role. Whatever our job, we need some grasp of data – its opportunities and its limitations – to perform effectively. Some jobs will require more data capability than others – an entry-level administrative role and developing sophisticated machine learning tools will have different needs – but it is no longer acceptable to say ‘I don’t do data’.<sup>2</sup> The ‘data economy’ [is growing and accounted for more than 4%](#) of UK GDP in 2020, and underpins billions of pounds of imports and exports.

But all of this also applies to our roles outside work, as citizens, in households and families, in our roles across the rest of our lives, as we all try to use, interpret and act upon information. And if the government wants to investigate and implement more ambitious data-related and artificial intelligence-enabled initiatives, they will require public trust and understanding to succeed: citizens will need to have more than a basic grasp of data so they can scrutinise and support such plans.

One of the six points in the [ODI’s manifesto](#) for open and trustworthy data ecosystems and ‘a world where data works for everyone’ is data capability: **‘Everyone must have the opportunity to understand how data can be and is being used. We need data literacy for all, data science skills, and experience using data to help solve problems’**. And it is why ‘data literacy’ – which the ODI defines as being able to think critically about data in different contexts and examine the impact of different approaches when collecting, using and sharing data and information – is no longer a niche topic.

Data is a particular focus of the UK government plans at present. The pandemic response brought data into the heart of government decisions like never before: one minister described it as a [‘high watermark of data use’](#). The government’s work and plans for the country are increasingly dependent on data, with a [NDS](#), [UK Innovation Strategy](#), [National AI Strategy](#), a [vision for foreign policy](#) that highlights the UK’s global role in AI and setting international standards, and a [multiplicity of organisations](#) supporting the use of data across government. The forthcoming [Integrated Data Service](#) and government’s [recent proposals for data protection reform](#) highlight its commitment to greater sharing of data between public sector organisations and between the public and other sectors. As the government does more with data, the public sector workforce and the general public need more confidence in understanding what it is doing.

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<sup>2</sup> For some discussion of this in a business context, listen to the ODI’s [Inside Business podcast: The role of data literacy in building a trusted brand](#) from March 2022.



The government recognises the importance of data skills – ‘for a data-driven economy and data-rich lives’ – by making it [one of the four pillars of the NDS](#). Within this, it says that ‘foundational data literacy will be required by all’. The NDS recognises these challenges for industry and [for itself](#):

*Despite the many benefits that can be derived from data, institutionalised data culture – where data is seen as everyone’s job and where data is seen to support outcomes at all levels – is lacking in many organisations across government and the wider public sector... everyone, regardless of seniority or profession, should see data as a priority in their role – with data supporting each step of policy and delivery, from scoping to ongoing performance tracking, evaluation and improvement.*

The government’s approach to data literacy for its own workforce will have an impact on the wider economy, as it leads by example, provides support (such as making resources available) and collaborates with others. And it is a major employer in its own right (public sector employment accounts for [more than a sixth of all employment in the UK](#)), helping to shape the wider employment market, with workers moving in and out of the public sector.

Data literacy initiatives have a role in society, as well as the economy, as they can support individuals, groups and organisations to play an active role in our increasingly data-dominated world. They are also vital in government’s attempts to build trust as it embarks on more advanced projects involving data and technologies and techniques, like artificial intelligence (AI), as the public will need some understanding of its plans and products.

So how exactly is the UK government thinking about data literacy, as it aims to upskill its own workforce to better use data in making policy and delivering services to the public, and strengthen data sharing between departments and between government and other sectors? What initiatives are underway to improve data literacy within government? And what is it doing to foster data literacy more widely, in the general population and workforce? This report offers some answers to these questions.

This report draws on desk research and stakeholder interviews, and focuses on the ‘supply side’ – what the government is doing to get the right structures and support in place – rather than the ‘demand side’ – such as the public expecting a more data literate government. One stakeholder we interviewed used the Covid-19 pandemic as an example of where the public had driven improvements in government – a desire for more and better data and better presentation at Downing Street press conferences forced government to publish better data and present it more clearly. They wondered whether similar public demands in the future could help encourage data literacy in government and in the wider population. (We hope this complements the work currently underway by others, including [the Centre for Data Ethics and Innovation](#) (CDEI) and civil society organisations such as the Ada Lovelace Institute, on the importance of public understanding, trust and engagement.)

# Chapter 1: Data literacy: what it is and why it matters



*Data skills deliver benefits across the board. Businesses are more likely to be competitive in today's digital-driven economy if they can use data effectively. Likewise, data-literate individuals are more likely to benefit from and contribute to the increasingly data-rich environments they live and work in, while data-driven companies can deliver significant productivity benefits to their own business and the wider economy.*

DCMS, [National Data Strategy](#)

We live in the information age. There is more 'data' than at any point in human history. This data can be used for good, provide us with more economic and social opportunities than ever before, and help us be better informed; or it can be used to exploit, to exclude, and to confuse. Helping people navigate this data-rich world is therefore vital.

There are already divides in how we interact with this world. [A 2020 report on digital inclusion and online safety](#) by the Good Things Foundation has found that 'low media, digital and personal data literacy leaves people open to risks and harms: financial, social, emotional, personal and psychological'. Greater knowledge about data and how it is and can be used can help counter this, but 'people in lower socio-economic groups are less likely to see the benefits of sharing their data, and more likely to feel powerless to address data-related harms; while ethnic minority groups are slightly less likely to trust that their data will be secure'. The government's own tracker of [public attitudes towards data and AI](#), run by the CDEI for the first time in 2022, finds that only 20% of those with low 'digital familiarity' know 'at least a fair amount about how data is used and collected', compared to 45% of the general population.

Greater data literacy can help people in their working and social lives. This isn't a view confined to the government's policies towards data, such as the NDS: its 2021 [Plan for Growth](#) ('Build Back Better') notes that 'more than a quarter of the working-age population in England have low literacy or numeracy skills', citing the Industrial Strategy Council's forecast that 'five million workers could become acutely under-skilled in basic digital skills by 2030'. The plan adds: 'This holds back those people from employment, limits their ability to progress, reduces economic growth, and makes the UK a less attractive place to invest'.

## How the ODI thinks about data literacy



*Data literacy is the ability to think critically about data in different contexts and examine the impact of different approaches when collecting, using and sharing data and information.*

[Open Data Institute](#)

Following a blogpost on '[data literature](#)' by ODI's former CEO, Jeni Tennison, we often compare technical data skills to studying the English language, and 'data literacy' to the study of English literature. Where the study of language focuses on reading and writing and the production and manipulation of letters and words, the study of literature 'focuses on the study of that language in use, the material produced by different authors, their use of different techniques, the context in which they produced their works and the impact their work had'. If data language involves the requisite technical skills to collect, analyse and visualise data, then data literature or data literacy should be 'the study of data and how it is collected, used and shared by different organisations'.

Another metaphor might be that of a car. We don't all need to know how to build a car – although we do need some people with the technical skills to do so. But most of us do need to know the basics: how brakes and tyres perform in different weather conditions, the rules of the road, and the impact of buying an electric car rather than a diesel.

Technical data skills are vital – we need specialists who can build tools, write code and do things with data – but we also need everyone to have some ability to critique the use of data, understand its limitations and recognise its impact on society<sup>3</sup>. We need a blend of those skills to unlock the value of data for the economy and society. We need commercial awareness and understanding of how to identify the opportunities and risks of data-driven innovation and how to govern emerging technologies responsibly<sup>4</sup>. Increased data literacy in a population should help governments, businesses and other organisations evolve their data practices and become more trusted with data as a

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<sup>3</sup> 'When we asked which additional skills data scientists should have, communication and presentation skills topped our list; other frequently demanded expertise is in teamwork, social skills and data management. Data scientists are often hired with high expectations regarding their abilities to transform business tactics and strategies; thus soft-skills such as these are seen as desirable and need greater focus in data science training.' EDSA (2016), 'D1.4 Study Evaluation Report 2', <https://edsa-project.eu/edsa-data/uploads/2015/02/EDSA-2016-P-D14-FINAL-withouthPrivateAppendix.pdf>

<sup>4</sup> 'A new finding from the interview data is the need for data scientists to have good business skills in order to be able to understand business needs and to be able to effectively communicate insights. This is different from domain expertise in that business skills are the skills required to make domain expertise effective.' EDSA (2015), 'D1.2 Study Evaluation Report 1', <https://edsa-project.eu/edsa-data/uploads/2015/02/EDSA-2015-P-D12-FINAL.pdf>

result. Data literacy might include:

- Comparing and contrasting how different people use numbers, graphs and infographics to convey important messages on topics such as climate change, population growth or global pandemics.
- Evaluating the impact of bias and limited sampling on important decisions, such as those in the criminal justice system or when hiring workers for a company.
- Examining the ways that data is collected and the purposes of this collection, such as irregular collection in a census, how sensors in trains, cars and busses keep those vehicles running, or our interactions with digital assistants.

It is worth underlining that these definitions do not apply only to numerical data.

[The ODI's Data Skills Framework](#) clarifies and categorises various different data skills:

**Figure 1: ODI Data Skills Framework**



On the right-hand side are the more technical and practical skills involved in data analysis and engineering. But on the left are those more critical, contextual and strategic skills that might be involved in data literacy, supporting people to understand and critique how data is and can be used. Down the middle are the skills associated with being a 'data translator', someone able to balance both sides.

## The importance of measuring data literacy

Measuring data literacy is obviously important for understanding what the current situation is, what aspects are particularly in need of improvement, where best to target training and support, and to understand what progress is being made on everything from the ambitions of the NDS to the necessary improvements in digital skills recognised by the Plan for Growth.

But those working on data literacy, in government and elsewhere, note the challenges in measuring data literacy and its impact in understanding the impact of interventions. A good example of these was provided by the ONS in 2018. It considered [creating a 'data literacy scale'](#), based on the Government Digital Service (GDS)'s [digital literacy scale](#), which could score people from 'beginners' (little interaction with data) to 'pioneers' (being able to deploy machine learning and AI). One of the biggest challenges came from 'conflating a number of different spheres' in trying to come up with an assessment scale, with those spheres including everything from data formats, and tools and practices often associated with data science, to understanding the limitations of data, visualising data, understanding its licensing and re-use, right up to understanding the reason for using the data in the first place. The lack of a consistent definition of 'data literacy' is clearly a hindrance.

As is the lack of previous work, metrics and data on measuring literacy and skills. The [NDS evaluation and monitoring framework](#) acknowledges this noting that, while the evidence base on the 'data skills gap' in business is improving (including through [work commissioned by DCMS](#)), 'there are few standing metrics reported on a regular basis' and there is 'limited evidence on the level of data skills in the general population, and about the demographic breakdown of people with data skills in the general workforce'.

There will be some usable, if limited, metrics available. These will include metrics on individual training courses, such as completion rates, or detailed evaluations of particular initiatives, such as [the current DCMS project with the OfS](#) to improve foundational data literacy on non-data university courses.

In a forthcoming conference paper, 'Towards benchmarking data literacy'<sup>5</sup>, the ODI's Calum Inverarity, Dr David Tarrant and Emilie Forrest, with Phil Greenwood from Glacis, propose a framework to help individuals and teams assess their level of data literacy:

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<sup>5</sup> Calum Inverarity, Dr David Tarrant, Emilie Forrest, and Phil Greenwood (2020), 'Towards Benchmarking Data Literacy'. In Companion Proceedings of the Web Conference 2022 (WWW '22 Companion), April 25–29, 2022, Virtual Event, Lyon, France. ACM, New York, NY, USA, 9 pages.

**Figure 2: ODI Levels of Data Literacy**

Level	Criteria
<b>Below Level 1</b>	Able to recall a single piece of specific information as presented in a graph or chart. Not required to understand the structure or meaning of the data.
<b>Level 1</b>	Able to understand the meaning of information or data presented to you. Able to explain what a simple graph means.
<b>Level 2</b>	Able to consider where the information has come from and how this impacts the message being presented. Able to paraphrase and make low-level inferences from data and how it is presented. Able to interpret data to state a new fact or existing one in a new way.
<b>Level 3</b>	Able to question the validity of claims, such as a misleading graph, and can spot fake news. Able to interrogate data and information from a variety of sources. Able to understand wider context and subtleties, and some limitations or bias in how data is collected, used and shared.
<b>Level 4</b>	Able to evaluate the methodology behind how the data was collected and interpreted and what impact that has on the conclusions drawn. Able to bring together data from different sources or collected with different methodologies to draw new conclusions and make informed decisions about current or future direction.
<b>Level 5</b>	Able to synthesise or create original ideas based upon a thorough evaluation of a broad range of data/information sources combined with specialist knowledge. Able to recognise your own biases and limitations, as well as those already present in the data/information resulting from how it was originally collected or interpreted. Also able to recognise what biases or limitations that might result in, including deeper societal biases that might not have been corrected for, and take appropriate steps to mitigate for that bias.

The authors note some of the problems with self-assessment – people will be generous to themselves, and the wide range of topics covered by ‘data literacy’ means respondents will have their own interpretations of the necessary skills and their relative importance, for example. But a framework such as this can help individuals and organisations understand their basic literacy levels.

## Data literacy and other types of literacy

How the government defines ‘data literacy’ has a big impact: the UK public sector is responsible for [more than one sixth](#) of all employment in the UK, and what the government does sets the example, policies and education and training provision that others will follow and work with. In UK government documents, ‘data literacy’ is often used interchangeably or quickly elided with ‘data skills’. But there are also other overlapping ‘literacies’ which feature in these documents. There is a risk of fragmentation, duplication and contradiction in government’s work across these different definitions if the government does not consider them – and where to invest its time, attention and money – more coherently. Nonetheless, many of the aspects of ‘data literacy’ are foundational to the other kinds of literacy.

### Literacy and numeracy

It is worth acknowledging the even more foundational literacy and numeracy, described by Prime Minister Boris Johnson as ‘the building blocks of a world-class education’ which ‘unlock the learning, knowledge and skills that every child needs to succeed in later life’ at the launch of [the Schools White Paper](#) in March 2022. The ‘[functional skills framework](#)’ from Ofqual, the examination and qualification regulator, includes English and mathematics alongside Information and Communication Technology and ‘digital skills’ as ‘[fundamental, applied skills...](#)’ which help people to gain the most from life, learning and work’. (‘Data literacy’ would appear to be fundamental to most of these, but is not recognised here as a fundamental skill in its own right.)

### Financial literacy

There is also the widely-recognised ‘financial literacy’, [defined by the European Commission](#) as ‘the knowledge and skills needed to make important financial decisions’, with [a recent grant](#) from the government’s Levelling Up Fund for a wellbeing and employment fund in the Scottish Borders aiming to improve financial literacy alongside digital skills and mental health. Although GOV.UK includes a [2019 paper on financial literacy and concepts in financial decision-making](#) (from the Foreign, Commonwealth and Development Office), this is an independent academic paper rather than government policy.



## Digital literacy

The main synonym or similar concept is ‘digital literacy’ (this features 142 times on GOV.UK as of late March 2022, compared to 25 results for ‘data literacy’). Although this term again lacks consistent definition, there are exceptions: ‘digital literacy’ sometimes appears in assessments of new digital services, and the Government Digital Service has a [‘digital inclusion scale’](#) which ranks users according to their attitudes towards the internet (from ‘actively disengaged’ to ‘confident explorers’). Most uses of ‘digital literacy’ appear to refer to people’s ability to use the internet and access online services – the 2022 [National Cyber Security Strategy](#) worries that ‘digital divides have also created uneven access to online services and exposed people to online abuse and harms due to limited digital literacy and awareness of the cyber security measures we can all take to stay secure online’. A 2021 report on [‘Harnessing technology for the long-term sustainability of the UK’s healthcare system’](#) noted that ‘support for those from disadvantaged groups to improve their digital literacy and/or confidence in using digital tools and equitable access to online services’ must be ‘placed at the heart of the system’ if health inequalities are to be addressed. Digital exclusion – including a lack of digital literacy – is a major theme of the CDEI’s [AI Barometer 2020](#) (it also identifies a lack of ‘public e-health literacy’, with people unable to assess the reliability and accuracy of different online health information sources, as a problem). [Elsewhere](#), CDEI calls for regulators to better coordinate their digital literacy campaigns. A [2016 Review](#) of publicly funded digital skills qualifications argues that ‘digital literacy must be given the same importance as numeracy and literacy’ and general digital skills should be integrated with technical and professional progression routes. It also highlights the need for a shared language and calls for government to take ‘completing the jigsaw’ seriously and ‘consider how to bring together the findings of this and other reviews to deliver a coherent flow of relevant digital skills for the UK economy’.

Parliamentarians – who tend not to talk much about data literacy – are also fans of increased digital literacy. The Digital, Culture, Media and Sport Select Committee’s [2019 report on disinformation and ‘fake news’](#) recommends that ‘digital literacy should be a fourth pillar of education, alongside reading, writing and maths’. A 2017 [Lords select committee on growing up with the internet](#) also supports digital literacy as a fourth pillar of education and defines it as ‘the skills and knowledge to critically understand the internet’ which is ‘vital for children to navigate the online world’ and ‘an essential requirement of the future workforce’. In these examples ‘digital literacy’ seems to include how people navigate the online world, but not the more basic digital skills (for example, being able to turn on and operate digital devices) outlined in the government’s own [essential digital skills framework](#).

## Media literacy

There is a great deal of overlap between how ‘digital literacy’ is implicitly defined and another term, ‘media literacy’ (80 results on GOV.UK). There is at least one clear definition of this term from communications regulator Ofcom, that has a statutory duty to promote media literacy, and defines it as ‘the ability to use, understand and create media and communications in a variety of contexts’. It publishes media literacy tracker surveys and runs a media literacy programme, [Making Sense of Media](#). A recent [Ofcom/LSE rapid evidence assessment](#) in 2021 highlights three types of media literacy skills (critical thinking, evaluation strategies, knowledge of operation of news and media industries) with a consistently positive effect on engaging with misinformation. There is a fair amount of discussion of media literacy in relation to [the Online Safety Bill](#) – which the 2021 [Online Media Literacy Strategy](#) comes out of. This identifies people understanding how personal data is used, and understanding how data fits into algorithms and the wider operation of the online environment as two of its five principles. Additionally, DCMS has [a collection](#) of online media literacy resources, media literacy is mentioned in the 2021/22 [Digital Regulation Cooperation Forum workplan](#) and there is a [Media Literacy Taskforce Steering Board](#) (GOV.UK lists its members but provides little further information). It even crops up in the government’s major foreign policy publication, [Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy](#) in 2021, with a pledge to support it as part of tackling online harms and disinformation.

Having heard various definitions, a 2018 Lords select committee report, on [‘digital technology and the resurrection of trust’](#), actually combines and defines digital and media literacy: ‘We use the term ‘digital media literacy’ because our purposes go beyond, but do include, the functional skills required to use technology. We define digital media literacy as being able to distinguish fact from fiction, including misinformation, understand how digital platforms work, as well as how to exercise one’s voice and influence decision makers in a digital context.’

## AI literacy

Although ‘AI literacy’ doesn’t appear by itself, it appears as ‘AI and data literacy’ in [the 2021 AI Roadmap](#) from the AI Council, a group of independent experts advising government (discussed again below). Despite the risk of getting carried away with an exciting and ‘shiny’ technology, the AI Roadmap provides some of the most holistic thinking and substantial recommendations around data literacy. Some government interviewees thought there was an advantage to talking about literacy attached to a more exciting technology, as ‘you can use the shiny thing to get people interested in the basics’. This may be especially important as people will not always know what such terms mean, and can either dismiss the concept as ‘newfangled nonsense’ they don’t need to think about, or become overenthusiastic about it as a ‘magic bullet’, underlining the need for greater literacy.

## Other literacies

‘Statistical literacy’ makes a few appearances. It is [described by a former president](#) of the Royal Statistical Society as ‘an essential life skill: the need to make decisions based on numerical data confronts us all in every aspect of our professional and personal lives’; is referenced in government’s 2021 [Life Sciences Vision](#), which demands ‘digital, computational and statistical literacy’; and the UK Statistics Authority’s (UKSA) strategy for 2020 to 2025 ‘[Statistics for the public good](#)’, which says the UKSA ought to advocate for greater statistical literacy, since ‘in our data-rich society a good level of statistical literacy will help individuals deal with their finances, understand risk or hold the powerful to account’. ‘Mathematical literacy’ is mentioned a couple of times, notably in 2021’s [Quantifying the UK Data Skills Gap](#), where ‘a review of curriculum content and mathematical literacy demonstrates the need for rapid change to ensure a ‘fully data-literate population’. ‘Information literacy’ also features on GOV.UK, particularly in the context of libraries – including [plans to support library workers](#) teach members of the public about it as part of the Online Media Literacy Strategy. There are also a few mentions of ‘tech literacy’, which does not appear to be defined anywhere on GOV.UK.

Conversations with people in government also introduced ‘analytical literacy’ and ‘evaluation literacy’. The latter appears in a 2021 report by the National Audit Office, [Evaluating government spending](#), which argues the use of evaluation across government is ‘variable and inconsistent’ and that part of the problem is officials lacking the ‘evaluation literacy’ to understand evidence before making decisions. The analysis function and policy profession are conducting an audit to understand what skills there are.

‘Cyber literacy’ gets a solitary mention on GOV.UK – in an assessment of a new ‘[Report A Cyber Incident](#)’ service which says that ‘the team should look more at users with low cyber literacy’ – but cyber skills are also moving up the government agenda (as seen in this consultation on [cyber skills](#), and the provision of the [Cyber Explorers](#) learning platform).

## How these overlapping literacies relate to the ODI framework

Like the ODI, the Good Things Foundation, in [its report on digital inclusion and online safety](#), has noticed these overlaps. (The Good Things Foundation defines data literacy as ‘people’s understanding of the value of their personal data, how it is used and how to control this’, rather than people’s ability to interpret data.) It argues that ‘the types of literacy which citizens need today are more complex than even a couple of years ago’, and quotes the University of Liverpool that the different types of digital and data literacy citizens need, involve ‘not only being able to read and verify news and content, but also, understand the technical and media economics of digital platforms, how they are funded, what their different features and affordances mean and how they function, how to change their privacy and content settings and importantly their individual and collective rights’.

The skills involved in thinking about, understanding and using data that underpin and define the many other related ‘literacies’ are complex and various. The [ODI understanding of ‘data literacy’](#) – including comparing and contrasting how different people use data, evaluating the impact of bias and sampling, and examining how and why data is collected – is also key to making sense of all of these definitions and how they work together. Our definition of data literacy doesn’t just overlap with these other types of literacy, it is fundamental to understanding them, as highlighted by the variety of hexagons in the ODI’s Data Skills Framework and the forthcoming conference paper authored by members of the ODI team.

Definitions of ‘digital literacy’ in particular tend to engage the hexagons on the right-hand side of our Data Skills Framework (the more technical and practical skills involved in data analysis and engineering). Where that overlaps with media literacy and internet use, it tends to engage the hexagons on the left-hand side (those more critical, contextual and strategic skills that might be involved in data literacy), literacy-related hexagons come into play. The AI Roadmap’s definition covers both sides, while two of the AI Strategy’s ways of thinking about skills – using and inspiring – also engage some of the left-hand side. The various definitions also engage different levels of the ODI Levels of Data Literacy, with some saying everyone should have some level of familiarity, and others – such as analytical and evaluation literacy – perhaps focusing more on seasoned professionals.

# Chapter 2: Data literacy and the UK government

How the government defines data literacy shapes everything from the foundational and advanced education, training and support it makes available, to how other organisations think about data literacy. The challenges government faces in using data will be faced by other organisations too – and how government frames, conceptualises and counters these challenges will lead others by example.

There is no single, consistent definition of ‘data literacy’ in use by the UK government. Its NDS, for example, states ‘there is no widely agreed definition of data skills’.

Speaking to those in government working on data skills and data literacy elicits various working definitions of data literacy. These are often focused on evidence and analysis for policymaking, and such stakeholders readily acknowledge ‘data literacy’ isn’t properly defined anywhere. Our interviewees offered definitions including:

- Data literate people are those confident enough to ask the right questions about the data, understand what they can and can’t do with it, and appreciate that data is always a story – none of it is perfect, so they must understand where it has come from and what it really means
- We should take a further step back and ask why we think data literacy is necessary, to which the answer is that government needs people to understand data, especially from a policymaking point of view
- On a practical level, people need to be data literate to understand whether the evidence backs up their argument, or not
- Data literacy is ‘the ability to analyse evidence; take the right conclusions from it or understand when you can’t take certain conclusions from it; be able to spot when the data informing evidence is patchy, biased or non-authoritative; be able to spot when you can’t make informed decisions based on the data presented; and be able to articulate all of those things.’

These definitions tend to match up with a large part of the right-hand side of the ODI’s Data Skills Framework, around data analysis, although they also raise aspects of leadership (which is explored on the left-hand side), particularly thinking about developing policy and acting upon data. In understanding the imperfections and limitations of data, there is also implicit engagement with ‘working ethically’. The need for everyone to have some data literacy in these definitions means that it engages the ODI Levels of Data Literacy from the lowest levels upwards.

## In the National Data Strategy

While acknowledging the lack of widely agreed definitions, [the NDS](#) uses ‘data skills’ to

*broadly to cover the full range of basic, technical, governance and other skills – including project management, governance and problem solving – needed by practitioners to maximise the usefulness of data*

and ‘basic data literacy’ as requiring

*some knowledge of data uses, some ability to assess the quality of data and its application, and the skills to conduct basic analysis...[w]hile we do not all need to become data scientists, everyone needs some level of data literacy in order to operate successfully in increasingly data-rich environments.*

Although the NDS notes that the education system needs to better prepare everyone for ‘increasingly data-rich lives and careers’, the emphasis of much of the document is on the latter – data-rich careers, rather than data-rich lives. There is a focus on ensuring industry has a ready supply of people with specialist data skills, and that the workforce as a whole has some level of data literacy: for example, ‘it is important for the UK to have data skills capabilities in companies, from basic data literacy to advanced technical skills’ and ‘in the future, the use of data in our work must become the norm, rather than the exclusive domain of specialists.’

In the wider public sector, the NDS says the ‘lack of a mature data culture’ stems from ‘a fragmentation of leadership and a lack of depth in data skills at all levels’. It also cites an overemphasis on the risks of misusing data leading to ‘a chronic underuse of data and a woeful lack of understanding of its value’.

In its May 2021 [response to the consultation on the NDS](#), the government notes that those responding to the consultation ‘underlined the importance of building a culture of data literacy across government’, with 40% of respondents identifying ‘capability, leadership and culture as a key government priority’. This was highlighted not only in senior leaders – including politicians – needing the data skills to ‘promote and champion’ data in their departments, ‘but also more generally in that all civil servants and public sector workers should have a foundational level of data literacy’. However, there is no detail on what such a foundational level should look like and little extra information on how greater data literacy in government might be achieved (other than the critical role of a government Chief Data Officer in driving a ‘culture of data-driven decision making’).

As mentioned above, the DCMS honesty in acknowledging the challenges of defining data literacy and data skills via the NDS extends to its draft September 2021 [monitoring and evaluation framework](#) policy paper. As well as noting that the good evidence base on the ‘data skills gap’ in business is not matched by standing metrics or evidence on skills in the general population, it says it would like better measures on success in hiring more civil servants with data skills and ‘training more civil service leaders to understand the potential of data’. Data literacy isn’t explicitly mentioned.

Part of the evidence base on the ‘data skills gap’ comes from a 2021 report commissioned by DCMS, on [Quantifying the UK Data Skills Gap](#). This concentrates on better data literacy and more data skills in the workforce. It lists ‘data literacy’ as number six on its list of the top ten things companies need to improve. Several of the other areas for improvement, such as information management, knowledge of emerging technologies and solutions, data communication skills, data ethics, analysis skills and analytical mindset, would be covered by definitions of ‘data literacy’, including the ODI’s. While also acknowledging the lack of agreed definitions around data skills – noting narrow definitions that focus on technical skills, and more comprehensive ones incorporating ‘other skills that help to interpret data’ – it attempts a brief definition of data literacy as the ‘ability to draw information out of data and turn it into actionable knowledge’, which would put it at Level 4 on the ODI’s Levels of Data Literacy (‘using data to make informed decisions’). The report also [cites a definition of data literacy](#) from a 2016 journal article: ‘a specific skill set and knowledge base, which empowers individuals to transform data into information and actionable knowledge by enabling them to access, interpret, critically assess, manage and ethically use data’.

The NDS and related documents, then, are clear on the importance of data literacy, give some sense of the topics it might cover, and acknowledge the lack of consistent definitions of data literacy and data skills. But they do not attempt a definitive definition or conflate literacy with other data skills (which would fall under ‘literacy’ under the ODI and others definitions), and tend to focus on data literacy being important for the workforce rather than wider society.

## In the National AI Strategy

The government's [National AI Strategy](#), published by the [Office for Artificial Intelligence](#), [Department for Digital, Culture, Media & Sport](#), and [Department for Business, Energy & Industrial Strategy](#), focuses on specialist skills, but does touch on data literacy. It takes a three-pronged approach to skills:

- 'build', to attract 'top talent' and 'train and attract the brightest and best people at developing AI' through interventions at PhD and master's levels;
- 'use', which includes a pledge to 'empower employers and employees to upskill and understand the opportunities for using AI in a business setting'; and
- 'inspire', which includes ensuring that 'programmes that engage children with AI concepts are accessible and reach the widest demographic' through the [National Centre for Computing Education \(NCCE\)](#).

## In other documents

Several other government documents cover similar ground, underlining the importance of data literacy for all (especially at work) without ever quite defining it. The 2019 [Government Technology Innovation Strategy](#) pledged to 'create data-literate civil servants through world-class training' and help 'to develop both data specialists, and data skills among non-specialists', including courses that would 'help decision-makers appreciate the power of data in government transformation and how best to work effectively with data professionals'. The 2017 to 2020 [Government Transformation Strategy](#) included a pledge to 'increase awareness of data, building on fundamental data literacy to help public servants access rich datasets and make evidence-based, data-driven decisions'. The [Wade-Gery review](#) 'Putting data, digital and tech at the heart of transforming the NHS' highlights concern about digital inequality – noting worries about the unintended consequence of digital transformation, such as excluding 'those who are less digitally literate' or with poor access to telecom services. It recommends NHS services 'build basic data and digital literacy and capability at all levels' as 'understanding the importance of data and digital and being able to use them effectively must become a requirement for staff'.



A 2021 [speech by Julia Lopez](#) MP, then the minister responsible for digital government, underlined that ‘we need digital skills and understanding across all levels of government – we need to bring everyone along on this journey. So improving the digital and data literacy of all civil servants and members of government, particularly senior leaders, is crucial to realising the ambition of having world leading digital services and the next phase of digital transformation’. (The [NAO’s 2019 report on data sharing](#) across government also notes that ‘departments need to have skills at several levels: to understand how to use legislation appropriately for legitimate data-sharing; to know the limitations of the data they hold; and what is needed to fix the problems. Those at senior levels need to understand the implications of poor data to help provide the influence at higher levels and gain traction for improvements’.)

There are some calls for government to take a more active role in fostering data literacy. Several respondents to [a consultation on part of the Data Protection Act](#) ‘called for a more effective data literacy strategy, starting with education in schools about data rights and redress mechanisms’. A minority of respondents to [a consultation on the CDEI](#) also suggested it might have ‘a role in delivering education and data literacy campaigns, to ensure the public is able to engage with the issues in an informed manner’. The [Lords select committee on AI](#) called on public sector organisations to collaborate with civil society organisations and the private sector to ‘improve digital understanding and data literacy across society, as these are the foundations upon which knowledge about AI is built’.

The idea that data literacy should extend to all citizens is not a new one. The 2013 [UK data capability strategy: seizing the data opportunity](#) has ‘human capital’ as one of its three overarching aspects to data capability, and defines ‘human capital’ as a skilled workforce and data-confident citizens. Although the strategy does not refer to this as ‘data literacy’, its view of skills includes business managers being aware of how data analytics can transform business, so it goes beyond technical data skills, and it asserts ‘all UK citizens should have an understanding of data – how it is created and stored – and confidence in its use and their rights’.

Also noteworthy is a service assessment – a key milestone in the development of a new digital public service – for ‘[Use land and property data](#)’ from 2018. The service failed to meet its alpha stage assessment (alpha being the prototype and ideas stage) because more user research was needed on users with lower data literacy – but the assessment complimented the service team on developing different personas (fictionalised versions of users) to explore different levels of data literacy.

The devolved nations also have some definitions. Scotland's [Data Lab](#) is a partner in [Data Skills for Work](#), which uses the definition of one of the other partners, Qlik: 'Data literacy is the ability to read, work with, analyse and communicate with data. It's a skill that empowers all levels of workers to ask the right questions of data and machines, build knowledge, make decisions, and communicate meaning to others'. The Scottish government's '[A changing nation: how Scotland will thrive in a digital world](#)' also says: 'We must also widen the definition of digital literacy to include a focus on both cognitive and technical skills, so our people are able to use technology collaboratively to find and evaluate information and to communicate ideas creatively'.

In Wales, the [Curriculum for Wales](#) includes 'digital competence' under its 'cross-curricular skills and integral skills', where contributions to work can include 'capturing and interrogating data, recognising and evaluating computational processes, designing and expressing learners' thinking using digital devices and systems'. One suggested content area is 'storing and processing data' as 'through data literacy and data management, learners can better understand how data drives our computational world'. A [2020 OECD assessment](#) of Northern Ireland's approach to skills recommends revising part of the curriculum 'to focus on the development of digital and data literacy skills'.

Some of these documents, then, have a greater appreciation of the role of data literacy in society, as well as the economy. Some recognise the need for data literacy for all – including both senior leaders and non-specialists in data. But again there is little detail on what data literacy involves and how to go about developing it.

## In individual government departments

Individual departments are developing their own approaches to data literacy, which recognise the need for all staff to have an understanding of data and its uses. The [Data Strategy for Defence](#) says all personnel (including ‘data and non-data professions’) will ‘complete mandatory data literacy training across Defence skills frameworks to develop a Defence-wide digital and data literate organisation’, and wants ‘expert data professionals, alongside all personnel being data-literate and data-aware’. It adds: ‘This will allow personnel to focus on what they were employed to do – make informed and effective decisions’, noting ‘data literacy skills will be recognised as fundamental as weapon handling, with data as the lifeblood of operations and the firm base’. The [Home Office’s Digital, Data and Technology 2024 Strategy](#) prioritises ‘improving data literacy across our organisation and creating a familiarity that helps people gain confidence using and handling it’. It states that staff in all of its business areas should understand what answers their strategic datasets can provide, and staff who handle and rely on data ‘should understand their legal obligations and be aware of how to find, collect, store and share [data] securely’ and ‘be familiar with its provenance and know which strategic data sets are important for answering critical questions’.

The Home Office’s reference to staff understanding their legal obligations raises questions about a particular form of data literacy (which might fit under ‘developing policy’ or ‘governing access’ in the ODI’s framework, on the left-hand side among other strategic, contextual skills): how aware are staff of the various data-related laws and regulations they are operating under? The government consultation on [‘Data: A new direction’ lists the eleven pieces of legislation the ICO is responsible for enforcing](#), including GDPR, the Data Protection Act, the Privacy and Electronic Communications (EC Directive) Regulations, the Freedom of Information Act and the Re-use of Public Sector Information Regulations, and there will be other legislation integral to civil servants in their daily work (such as the Public Records Act). There are also various other frameworks and pieces of guidance (such as the government’s own [Data Ethics Framework](#)) available to support public servants in their work. But it is unclear to what extent most parts of government consider awareness of these legal obligations to be part of data literacy, and to what extent resources to understand them all are made available (although ‘understanding the Data Protection Act’ is part of the [Fundamentals of Working in Government stream](#) of the new government curriculum – see below).

## How these definitions relate to the ODI framework

There are two obvious similarities between the various government definitions of ‘data literacy’ and the way the ODI thinks about it. The first is that ‘literacy’ goes beyond merely technical skills to understanding some of the context of data being used (particularly in making policy and other decisions). The second is that literacy is something that everyone, not just data specialists, should possess. But most government documents tend to focus on the economic opportunities rather than the wider societal implications. And there is relatively little detail about exactly what government intends to do to develop or improve data literacy, and no systematic exploration of the subjects that should be covered or the expectations for a digitally literate population or workforce that needs to be met.

On the lack of definition, it would appear the Central Digital and Data Office (CDDO) is on the case. In [an update to parliament’s Public Administration and Constitutional Affairs Committee](#), Cabinet Office notes that the CDDO ‘is developing and piloting a ‘Digital and Data Criterion’ that defines the skills and behaviours, associated with data literacy and digital orientation, required of Senior Civil Servants (SCS) across all professions (for example Commercial, HR, and Operational Delivery). This forms the foundation of our training needs analysis and development of critical learning products’. Again, though, this may not clarify or spell out the need for a required level of data literacy for civil servants at all levels.

## How others think about data literacy

The UK government and the ODI are not the first organisations to think about ‘data literacy’ and how to define it. The forthcoming conference paper authored by members of the ODI team notes there has been considerable discussion in academia, and these discussions are starting to evolve from a focus on the skills needed by students and researchers, to the needs of wider society. Even if disagreements about precise definitions remain, there is at least a body of work to draw on which can be used to bring structure to conversations around data literacy.

The authors quote a definition by [Wolff et al](#) that:

*‘Data literacy is the ability to ask and answer real world questions from large and small data sets through an inquiry process, with consideration of ethical use of data. It is based on core practical and creative skills, with the ability to extend knowledge of specialist data handling skills according to goals. These include the abilities to select, clean, analyse, visualise, critique and interpret data, as well as to communicate stories from data and to use data as part of a design process.’*

Arguably, this can still be interpreted as a narrow and technical definition, missing some of the wider contextual points (such as the impact on society) of the ODI definition. Other, wider definitions sometimes distinguish between ‘active’ skills (those involved in actually doing things with the data) and ‘passive’ ones (which speak to being able to contextualise the data). A concept note by the OECD on [core foundations for education and skills for 2030](#) underlines the importance of technical and social aspects of data with a definition by Carlson et al: ‘Data literacy is the ability to derive meaningful information from data, the ability to read, work with, analyse and argue with data, and understand “what data mean, including how to read charts appropriately, draw correct conclusions from data, and recognise when data are being used in misleading or inappropriate ways”’.

Wolff et al’s approach, which includes collecting and sorting existing definitions, allows them to think about data literacy from different perspectives:

- **Different points in an analysis cycle.** This includes the PPDAC approach used for statistical thinking in New Zealand – Problem, Plan, Data, Analysis, and Conclusion
- **Different interactions with or uses of data in different contexts.** They give the examples of data as evidence, data as a tool for innovation, and data literacy for job opportunities
- **Different types of data literate citizen.** In advancing order of required literacy, these are the reader (consumes data), the communicator (can talk to others about it), the maker (works with data) and the scientist (higher level engagement).

Some of these approaches to thinking about data literacy can be found elsewhere. Take the different personas or types of data literate citizen. In 2014 the [UK Digital Skills Taskforce](#) distinguished between ‘digital citizens’, ‘digital workers’ and ‘digital makers’; [Data Skills for Work](#), an ongoing initiative involving the Scottish government’s [Data Lab](#), among other partners, differentiates between ‘data citizens’, ‘data workers’, ‘data professionals’, and ‘data leaders’; and [this 2018 ONS blogpost looks at an attempt to develop a ‘data literacy scale’](#) which divided the potential audience into ‘beginners’, ‘readers/explorers’, ‘makers’, ‘communicators’, ‘scientists’, and ‘pioneers’. This also comes through from government’s various literacy and skills training offers: those developing training appreciate that more junior staff and senior leaders will have different needs and expectations, and there will be differences between initiatives aimed at basic, day-to-day understanding of data and targeted interventions such as helping members of public sector boards scrutinise the systems they are responsible for.

A prominent example of thinking about literacy through different situations or tasks is the University of Liverpool's current [Me and My Big Data – Developing Citizens' Data Literacies](#) project. The project's [Data Citizenship Framework](#) groups 21 key components of data literacy (outlined by previous work) under the three headings of 'data doing' (such as creating, visualising and interpreting data), 'data thinking' (awareness of rights, understanding data society) and 'data participation' (engaging with debates, participating in society using data, activism). This speaks to a tension mentioned in our stakeholder interviews: an acknowledged need for general data literacy, but an inability to bring data literacy to life, or target learning interventions to achieve it outside specific, predominantly professional, contexts, which may explain why data literacy in professional work contexts is often prominent in the literature.

## In the AI Roadmap

One hypothesis we had at the start of this project was that the UK government might be neglecting basic data literacy for its workforce in favour of ostensibly more exciting skills around AI. It's ironic then, that one of the most holistic and thoughtful explorations of 'data literacy' is found in the 2021 [AI Roadmap](#) from [the AI Council](#). This is an independent committee of experts 'set up to provide advice to the Government and high-level leadership of the AI ecosystem'. One of its 16 recommendations is to 'commit to achieving data and AI literacy for everyone', which sits alongside two other recommendations on 'skills and diversity', one dealing with 'high-level AI skill building' and the other with prioritising diversity and inclusion within the field. This is an holistic view which brings together skills for all, specialist skills and the importance of diverse perspectives.

The council's roadmap argues that 'the public needs to understand the risks and rewards of AI so they can be confident and informed users' and recommends an online academy for understanding AI, with 'trusted materials and initiatives' to support teachers, school students and lifelong learning. It argues 'every child [should] leave school with a basic sense of how AI works', and that this basic sense should go beyond 'the basics of coding or quantitative reasoning', describing mathematical concepts and understanding ethics to include 'knowing enough to be a conscious and confident user of AI-related products; to know what questions to ask, what risks to look out for, what ethical and societal implications might arise, and what kinds of opportunities AI might provide'. It highlights the risk that, without this basic AI literacy, 'the UK will miss out on opportunities created by AI applications, and will be vulnerable to poor consumer and public decision-making, and the dangers of over-persuasive hype or misplaced fear'. Ongoing resources to support public engagement could even underpin future regulatory infrastructure 'by ensuring that public debates were consistently well-informed', building public trust and allowing informed scrutiny.

## How other definitions relate to the ODI framework

Although they approach it in slightly different ways, a general similarity between these definitions and the ODI framework is the importance of context, and the wider, non-technical considerations about how data is used and its impact in particular scenarios (those elements that are highlighted in the hexagons on the left-hand side of the ODI Data Skills Framework). Framing data literacy, for example by looking at where it sits in the data cycle, or the different types of tasks that may be undertaken or data citizen who may undertake them, also underlines that different people may need different types and levels of data literacy skills at different times.

Additionally, a constant theme in the wider literature which fits with ODI (and indeed, government) thinking is the need for both a group of people with specialist, technical skills, and for the broader population to have some grounding in data literacy, engaging both the lowest and highest levels of the ODI Levels of Data Literacy. This dual need is present in everything from the [Royal Statistical Society's Data Manifesto](#) to the [British Academy's Count Us In](#) report, to the [Royal Society's Dynamics of data science skills report](#). In [Doteveryone's famous phrase](#), 'digital understanding is not about being able to code, it's about being able to cope'.

Some of those reports explore the balance between those specialist skills being mainly of use for the economy, while the more general data literacy can also benefit individuals as citizens (for example, helping them navigate information in their personal or civic lives). Interestingly, some of the reports government cites as being influential – for example, [Analytic Britain: Securing the right skills for the data-driven economy](#) by Nesta and Universities UK – have more focus on specialist skills (in the Analytic Britain example, trying to find data scientists who can combine technical, analytical, industry, business and other soft skills and knowledge).

Perhaps the most developed approach to data literacy – the AI Roadmap's three-way model of general literacy, specialist skills and diversity and inclusion, with data literacy in the general population being vital for understanding, supporting and even regulating innovation with data and AI – has unfortunately not been fully adopted by government.

# Chapter 3: Public sector data literacy initiatives for government

*'We need to transform the way data is collected, managed, used and shared across government, including with the wider public sector, and create joined-up and interoperable data infrastructure. We need the right skills and leadership to understand and unlock the potential of data.'*

Mission 3: Transforming government's use of data, National Data Strategy

*'Perhaps most importantly, government must also ask itself if its people have the skills necessary for the challenges that I have set out.'*

Michael Gove, 'The privilege of public service', 2020

Recent years have brought renewed focus within government on improving specialist skills through [the 'functional agenda'](#). Data (and digital) skills are part of this, but have also been given fresh impetus by the centrality of data to the government's pandemic response, and plans to increase data sharing between government departments (and between government and other sectors) in the [Data: A new direction consultation](#) and elsewhere. This is also a longstanding challenge: the [National Audit Office's 2019 report on data sharing](#) across government notes: 'departments need to have skills at several levels: to understand how to use legislation appropriately for legitimate data-sharing; to know the limitations of the data they hold; and what is needed to fix the problems. Those at senior levels need to understand the implications of poor data to help provide the influence at higher levels and gain traction for improvements'.

The government has made clear commitments to improve the data literacy of the public sector workforce. Data is one of the areas identified in the 2021 [Declaration on Government Reform](#) where the government should develop expertise. Mission 3 of the NDS, to transform government's use of data, includes several pledges on data literacy and data skills, many of them working with (what is now) the CDDO and other government organisations to improve data skills across the public sector. Those pledges include training analysts in data science (exceeding the target, according to [the government's NDS consultation response](#)) and delivering the range of actions to be outlined in the (completed but unpublished) Public Sector Data Capability Audit. They also include extending the data training offer to public servants. Further measures are also promised as part of the NDS, originally due in autumn 2020 but not yet launched.



And with [more than a sixth](#) of all workers in the UK employed by the public sector, the UK government's approach to upskilling its workforce will have a wider effect on the whole economy (Mission 1 of the NDS, to unlock the value of data across the economy, as well as Mission 3 on government's own use of data).

## How training, learning and development works inside government

The [GSCU](#) was set up as part of the Cabinet Office in September 2020, following the Ditchley Lecture given by Michael Gove (then Minister for the Cabinet Office, responsible for the civil service and how government operates).

It brings together various learning and training initiatives across government, including new ones like the curriculum and (online) campus for government skills, and existing ones that include:

- various Accelerated Development Schemes (like the Fast Stream for graduates, or Future Leaders Schemes for high-performing civil servants below the senior civil service level),
- the Leadership Academy (which aims to 'to accelerate the development of the knowledge, skills, networks and professional practice of all civil servants), the National Leadership Centre (which supports leaders and leadership practice across the wider public sector), and the Civil Service Leadership Group (a network of the so-called 'top 200' senior leaders across government) which will all form part of the Leadership College for Government, and
- 'central learning frameworks' like Civil Service Learning (a longstanding platform through which civil servants can access training courses).

The **various [functions and professions](#)** across government also have a vital role in developing and training civil servants. Senior politicians and officials and seasoned Whitehall watchers have long argued for the need to value civil servants with specialist skills as well as policy 'generalists' (who tend to move roles, jobs and policy areas more frequently). 'Professions' cover civil servants with particular professional skills, such as social research, science and engineering, and policy, while 'functions' relate to civil servants helping the government perform certain tasks it is responsible for, such as analysis, commercial or digital. These all have their own career frameworks, professional standards, networks (such as a cross-government working group with heads of data science), and their own training and development initiatives. The GSCU's fourth curriculum strand on specialist skills links to these initiatives, and professions and functions sometimes have their own training institutions like the Government Digital Service Academy for the digital, data and technology profession.

There will also be **other initiatives** across government. Each government department and organisations across the public sector (including local government and organisations in the health service) are likely to have their own resources to support their own needs. There will also be private providers of training support to the government, operating within the Civil Service Learning and other frameworks – departments currently spend [around £300m a year](#) on training. As well as the ODI, these providers include the Civil Service College – which acquired many of the courses run by the National School for Government, the part of Cabinet Office which ran training for the civil service before it was abolished in 2010, and is now a private provider with no government involvement.

## Curriculum and campus

A January 2021 report, [Better Training, Knowledge and Networks: the New Curriculum and Campus for Government Skills](#), outlines key thinking around the role of the GSCU's approach to training and skills. The curriculum has five strands, from which civil servants can 'pick and mix' training courses.

Given that a foreword by Alex Chisholm, the Chief Operating Officer for the civil service, highlights 'the Civil Service's grasp of science and data' as one of the 'gaps in universal administrative core abilities and highly technical expertise', it is perhaps unsurprising that most of these strands have components dedicated to data (and data literacy, even if they are not defined as such).

The five curriculum strands are:

- **The Foundations of Public Administration**, which is universal training in and knowledge of essential skills for public servants to which every new entrant is entitled. Several of the 'fundamentals' relate to data, including 'Data handling and interpretation' and 'Data Masterclass for senior leaders' (more on this below), as well as 'Basic digital skills suite – Excel, PowerPoint, social media', 'Analysing evidence', and 'Quality of evidence'.
- **Working in Government**, a 'comprehensive grounding in the history and structure of government and how it works with the rest of the public sector' and developing skills to make practical use of that knowledge. The 'fundamentals' here include 'Working with data', 'Data protection', 'The Treasury Green Book' (which provides guidance on appraising, monitoring and evaluating policies and programmes), 'Government finance' and 'Science in the Civil Service'.
- **Leading and Managing**, including relevant practical skills expected of those with leadership and management responsibilities.
- **Specialist Skills**, which is 'training by the professions, for the professions'.
- **Domain Knowledge**, or developing and honing knowledge specific to a specialist area such as health, education or transport.

## Functions and professions

The fourth strand of the curriculum, Specialist Skills, links to the offers from the various professions and functions. These are aimed at the members of those groups – with some resources widely available, while others may be restricted.

The [Analysis Function](#) brings together several analytical professions in government, including geographers, actuaries, social researchers, operational researchers, statisticians, economists, data scientists and analysts. Its [mission](#) is ‘to support everyone in government to make better decisions so that policy and operations, deliver value for money and improve the lives of the people of the UK’. It is very active in supporting this mission – for example, it hosts [Analysis in Government Month](#), consisting of events highlighting and celebrating work and bringing together analysts from across the public sector. Its [training offering](#) is one of the more open, and impressive. Its [learning curriculum](#) claims it has something for everyone, ‘whether... you’re a member of one (or more) of the analytical professions or not’; even the [functional standard](#), which sets expectations for planning and delivering analytical work in government, includes resources that could fall under a data literacy heading (such as details of different practices, ways of thinking about analysis and a cycle of how a process should work).

[Its curriculum, courses and resources are split](#) into Ability (learn how to do something), Technical (get better at something), Behaviours (change a behaviour), Strengths (learn from experience/strengths of others), and Experience (experience something that will help me grow). ‘Ability’, for example, provides links to various standards, guidance (for example, government’s data ethics framework) and training (for example, an introduction to GDPR).

The other data- and information-related professions are a mixed bag in terms of what they provide. The [Government Statistical Service](#) has [an impressive array of links to courses and resources](#) – some of which appear accessible to those outside the statistical professions. [Digital, data and technology](#) links to [various GDS Academy courses](#), some of which – such as [‘introducing the basics of Artificial Intelligence in government’](#) – would belong under a banner of data literacy. [A document on continuing professional development](#) for the knowledge and information management profession includes various links – for example, on ‘knowledge principles for government’ – that could be useful in thinking about data literacy. Others – such as the [Government Economics Service](#) and [Government Social Research Service](#) – have their resources behind logins.

One civil service profession where data literacy is vital is the [policy profession](#), which includes the nearly 30,000 civil servants tasked with developing and delivering public policy. The policy profession, with support from the analysis function, has been taking the challenge seriously: one of the twelve standards in the [policy profession competency framework](#) is ‘data, analysis and scientific advice’, which requires policy professionals to be able to ‘apply research methods to model, test and improve policy solutions’ and ‘commission, understand and use data, evidence, and advice’ from analytical, scientific and technical sources. The [profession’s training prospectus](#) includes nine hours of workshops on ‘data and analysis’ with this blurb: ‘The growth of open data has changed how data is collected and analysed, allowing managers, analysts and policy professionals to change how they make decisions. In this topic you will explore how data, and specifically open data, can be used to improve policy development and implementation. You will also explore how to interpret data accurately and how to communicate data effectively.’ The Analysis Function is also currently [undertaking an audit](#) of analytical skills among policy officials, which is expected to conclude (with actions) shortly.

## Data masterclasses

‘Listening to data starts at the top’ according to an adage [attributed to Amazon founder, Jeff Bezos](#).

Reading through civil service training material and speaking to those involved in supporting data literacy in government, one initiative was front and centre: the [Data Masterclasses for Senior Leaders](#).

The masterclasses have been described by [one of their creators at GSCU and 10DS](#) (the Number 10 Data Science unit) as an [‘unusually-accessible, exceptionally-engaging and deeply-vocational online course](#) to help equip non-analyst senior leaders across government with the knowledge and skills they need to put data and evidence at the heart of their work’. They involve videos of some high profile speakers (including National Statistician Sir Ian Diamond, mathematician and author Hannah Fry, and Professor Sir David Spiegelhalter), case studies of ‘exemplary’ data use in government, and quizzes and calibration tests. They cover:

- data-driven decision-making and policy-making
- communicating compelling narratives through data
- data science and new frontiers.

Interviewees inside government also highlighted the importance of each student being part of a cohort they could learn and discuss with.

The Masterclasses started in 2021 with senior civil servants – the idea being that [upskilling senior leaders](#) would drive demand for better use of data and evidence across government – but have since been rolled out more widely, including now being part of the Fast Stream induction, and inspired similar courses on innovation and demographics. The ONS Data Science Campus has since taken ownership of the programme.

[In its first year](#), more than 3,000 learners enrolled (28 cohorts from 26 departments), with a completion rate of 26% (compared to an industry standard of 12.6%).

## Other initiatives

The National Health Service (NHS) is also thinking about its data literacy offering. The [NHS Leadership Academy](#) is [currently conducting research](#) on the question, ‘What are the gaps in data literacy in Health and Care leaders and what training requirements will support evidence use in decision making?’ The [Analyst X community](#) is researching the needs of those engaged with analysis in the NHS. The [What Good Looks Like](#) framework – which NHS leaders should use to ensure their organisation and local health system is ready for digital transformation – includes a success measure of supporting people: ‘Your workforce is digitally literate and are able to work optimally with data and technology’. There is an [‘Information, Data and Content’ domain](#) within [Health Education England’s work](#) on the ‘digital literacy of the wider workforce’. The NHS is [using the apprenticeship levy](#) ‘to upskill the wider workforce in data literacy’ as well as developing more advanced skills. And [the Goldacre Review](#) into the use of health data, published in April 2022, includes a recommendation to ‘Create training specifically for senior leaders to help them become better customers for data analysis’, since there should be an expectation that non-analyst staff, especially those in management positions, should ‘have sufficient data literacy to conduct informed conversations about data’.

One major data literacy example in the health service is the [‘Making Data Count’](#) initiative run by NHS England and NHS Improvement, which provides practical guides and training ‘for those working at all levels in the NHS, from ward to board’ claiming to show participants ‘how to make better use’ of their data. It includes supporting staff and boards to understand ‘statistical process control’ – using averages and upper and lower limits to analyse performance and whether targets will be met.

The [Government Data Quality Hub](#), based at the ONS, focused on working with producers of statistics to improve their quality in its old guise as the Government Statistical Service Quality Centre. But it now aims [‘to improve the quality](#) of all types of data and analysis across government... by supporting organisations to better understand, communicate and improve the quality of their data and their analysis’. It produces resources, including a [framework](#), to understand data quality, and runs a training course on the basics of [data quality](#). Its [maturity framework](#) – being trialled – also has an expansive view of how organisations approach data, looking at uses, leadership, culture and skills (which asks ‘how data literate are your staff?’). The Hub also worked with the [Data Standards](#)

[Authority](#) at the CDDO to organise [DataConnect21](#), a series of events aimed at everyone 'from the most technical data expert who wants to talk about good dataset design, through to leaders who want to understand more about putting data at the heart of their organisation'. This is just one example of CDDO and others understanding the value of [networks and communities](#) in fostering relationships and learning across government.

And in its major 2019 report on [the challenges of data across government](#), the National Audit Office mentions training provided by the Ministry of Housing, Communities & Local Government (now the Department for Levelling Up, Housing and Communities) for chief executives and political leaders in local authorities 'to help support better use of digital services across local areas'.

One initiative, from outside government but aimed at it, is [Teaching Public Service in the Digital Age](#), an open syllabus for public service leaders. Competency 7 (of 8) is that ‘a digital-era public service leader understands how to use data to inform decisions, design and run services, and create public value inside and outside government’, offering to teach public servants to:

- understand what types of problems that will require data scientists versus statisticians or economists;
- identify the skills needed to acquire and clean data;
- ‘understand how the architecture and governance of new digital systems will make data more or less easy to use, share and maintain’;
- ‘explain how the gap between ‘policy data’ and ‘operations data’ is collapsing’; and
- ‘anticipate and mitigate problems related to the sharing of data within governments.’

There is also a [separate competency](#) – to ‘anticipate and mitigate the privacy, security and ethical risks that are inherent to governing in a digital era’.

## Assessing the offer against the ODI framework

On the subject of training materials, James Kuht, one of the creators of the Data Masterclass, told [an event at the Institute for Government](#) in February 2021: ‘there’s a wealth of content, but some of it was difficult to access. Some of it was great – but other parts of it weren’t the most engaging.’

It is difficult for this report to be definitive, given some resources are behind government logins and there will be many other offers from individual government organisations that are not obvious from outside government.

But looking at the offer from the GSCU and some of the functions and professions, a lot of the hexagons on the left-hand literacy side of the ODI’s Data Skills Framework relevant to strategic and contextual critical skills would appear to be covered (as well as awareness of, and some basic skills around, the technical skills highlighted on the right-hand side). Some hexagons not obviously covered might include ‘Innovating with data’ and ‘Achieving sustainability’, but the emerging [Government Office for Technology Transfer](#) and the Data Sustainability Charter mentioned in the NDS may deal with these in due course. One of the challenges in mapping the landscape is that some initiatives that are not obviously part of the central training and curriculum machinery have useful resources – such as the Government Data Quality Hub, or the [performance analysis community](#), which might support ‘measuring success’.

The various courses and resources also appear to span different levels of the ODI’s framework, with all civil servants being offered basic data literacy training as part of the government curriculum, and the professions and functions having more advanced offers. However, there is a risk that some of those things offered by the professions and functions that could be of wider use might not be more widely available, and that some of government’s most prominent initiatives – such as the Data Masterclass – started with senior leaders and may still focus on particular groups (such as future leaders) rather than all civil servants who could benefit. The biggest challenge may be understanding exactly what is available across the whole of government.



# Chapter 4: Public sector data literacy initiatives for others

The UK government is interested in the data literacy of the wider population and not just its own workforce. There are fewer of these initiatives and many have a workforce or economic focus, at the expense of engagement with the place of data literacy in people's lives outside the workplace. Also, many of the government's major announcements on literacy and skills have tended to be about more advanced skills. These include training public sector analysts in data science and using government tech fellowships to attract 'world-class tech talent' – both trumpeted in [the September 2020 press release](#) accompanying the NDS – and initiatives such as providing [up to £24 million to fund AI and data science degree conversion courses](#).

But there are some exceptions.

## The National Data Strategy

The [NDS](#) highlights several challenges for data skills across the economy, particularly:

- 'Lack of coordinated vision and leadership across multiple industry interests', requiring a 'coherent approach across all skills stakeholders and landscapes'
- 'Greater clarity needed in describing data skills required by industry'
- 'The need for the formal and vocational education system to better prepare those leaving school, further education and university for increasingly data-rich lives and careers'
- 'Industries needing to develop their understanding of their own data skills needs'
- 'A limited pool of data-skilled individuals nationally'.

Although the government recognises that some of these are for industry itself to address, it also takes responsibility for working with industry and delivering on some pledges itself. Acknowledging the shifting and uncertain definitions of data skills, one such promised action is to publish 'a working definition of data skills in the wider economy that sets out clear distinctions between data skills, digital skills and AI skills' – this has not yet happened (nor has a similar NDS pledge for a shared definition of data expertise across central government, though this may change with forthcoming work from CDDO).

But others have. DCMS actively supports the [Data Skills Taskforce](#). This is co-chaired by the Alan Turing Institute and Accenture, and consists of members from industry, academia and National Academies as well as government (and the ODI), and was established partly in response to Nesta's [Analytic Britain](#) report. It is cited as one of the main national leadership institutions on skills, and [with government backing](#) has created [a data skills self-assessment portal or tool](#) that allows small and medium sized enterprises 'to understand [their] organisational and technical readiness with respect to data'. There is also [an online course for leaders](#) with responsibility for data science functions, supporting them to 'develop a foundational understanding of the capabilities, risks and limitations of data and AI' in their organisation, 'explore the ways in which organisations are using data to create business value', and 'reflect on the data maturity' of their organisation and think about next steps.

Another major project under the auspices of the NDS is with the OfS, the public body that works with higher education institutions 'to make sure that students succeed in higher education'. DCMS and the OfS are working with seven universities to test [how 'foundational' data skills are being taught to undergraduates](#) whose degrees do not include substantial data science elements, an extension of existing work on [postgraduate conversion courses](#) for AI and data science. The evaluations are due to be published in summer 2022.

## Beyond the National Data Strategy

One of the pledges in the government's Online Harms White Paper and its work around internet safety and online harms (which has led to the Online Safety Bill currently making its way through parliament) was to develop an [Online Media Literacy Strategy](#). This was published by DCMS in July 2021. At the heart of the strategy is a media literacy framework consisting of five key areas, each based on a principle. One of these is the principle that: 'Users should understand the risks of sharing personal data online, how that data can be used by others, and are able to take action to protect their privacy online'. It [cites Ofcom polling](#) that indicates that, although 73% of users described themselves as 'very confident' or 'fairly confident' managing their data online, 44% of these 'confident' respondents were unaware that data could be collected through smartphone apps, 'and 20% were unaware of the existence of cookies altogether'. Other principles also include elements of what might be described as data literacy. For example, principle 2 says: 'Users should understand how the online environment operates and use this to inform decisions online', and includes understanding how data feeds into algorithms and social media business models within its expectations. The Online Media Literacy Strategy is unusual in major government literacy initiatives in being aimed at individuals as citizens or going about their normal (online) lives, rather than being focused on their role in the workforce.

The DfE also provides a list of [Skills Bootcamps](#) for eligible adults aged 19 and over, available online and in locations around the country. This includes many courses under a ‘digital’ heading, such as digital leadership, AI and machine learning, and several around data and data analysis. They are all aimed at helping people develop sector-specific skills and be fast-tracked to interviews with local employers (and therefore focus on targeted skills rather than more general data literacy). The department is also responsible for piloting some data-centric short courses under the Lifelong Learning Entitlement as part of [a trial with the OfS](#).

DfE is also responsible for the [Essential Digital Skills Framework](#), which ‘defines the digital skills adults need to safely benefit from, participate in and contribute to the digital world’ and is designed to support those offering training to adults ‘to secure their essential digital skills’. It also informs the [Lloyds Bank Consumer Digital Index](#), which conducts a survey of basic digital skills. Data-related skills in the framework include understanding ‘that others can capture and use my data and that I can protect and secure my personal data against such threats through privacy settings’ and ‘that I must not share other people’s data online without their consent’, while ‘additional skills for work’ include ‘use appropriate software, including a spreadsheet, to manipulate and analyse data to help solve problems at work’. This framework does not appear to be cited in any subsequent government work on data literacy and has few other mentions on GOV.UK. A 2021 report by [FutureDotNow](#) argues that the framework has not yet achieved cut through, and estimates 17.1 million adults (52% of the workforce) still lack essential digital skills for work.

The ICO runs the [Your Data Matters](#) programme, which has a range of resources including lesson plans, and [Ofcom’s Making Sense of Media](#) is a major programme to support the development of online skills. The devolved administrations also have their own programmes: for example in Scotland, the [Data Lab](#) has funded some training and is a partner in [Data Skills for Work](#), a project that ‘aims to provide all of our citizens, from school pupils to adult learners, with the opportunity to learn and master the necessary skills to drive and sustain data driven innovation in the region, regardless of background, gender or location’, including a basic level of data literacy. It notes ‘we all need to be more data savvy’.

It is striking that, while some major UK government programmes will rely on greater data literacy, they don’t have much to say about it. For example, [the Levelling Up white paper](#) includes various pledges on data, including a new body to ‘empower’ citizens to scrutinise local government through providing better data – but includes no consideration of the skills citizens will need to do so or the ecosystem required to support them. [Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy](#) uses the UK’s status as a ‘global leader’ in AI as a case study, and talks about strengthening this position through ‘improving the supply of AI talent and boosting high-level skills’, increasing investment in research, supporting the ethical adoption of technologies, and international partnerships, but says nothing specific about equipping the population with the literacy necessary to support this.

Although beyond the scope of this report, there are many non-government organisations also thinking about how to boost data literacy. One prominent

example is the [Alliance for Data Science Professionals](#), encompassing organisations including the British Computer Society, Royal Statistical Society, The Royal Society, the Royal Academy of Engineering, The Operational Research Society, Institute of Mathematics and its Applications, the National Physical Laboratory and The Alan Turing Institute, which is ‘defining the standards needed to ensure an ethical and well-governed approach so the public, organisations and governments can have confidence in how their data is used’.

## Assessing the offer against the ODI framework

The external offer seems lacking compared to the internal government offer on data literacy. Most of the initiatives focus more on data skills, rather than a more foundational data literacy offer. This means the focus is on the right-hand side of the ODI Data Skills Framework of technical skills, and the higher levels of the ODI Levels of Data Literacy, rather than the left-hand literacy skills and lower levels of data literacy for a wider population.

# Next steps

One of the six points in the [ODI's manifesto](#) for open and trustworthy data ecosystems and a world where data works for everyone is data capability: **'Everyone must have the opportunity to understand how data can be and is being used. We need data literacy for all, data science skills, and experience using data to help solve problems'**.

We believe it is vital that government recognises the importance of 'data literacy' as well as data skills, if it wants to develop a public sector workforce that is confident and capable in using data to make and implement meaningful policies, build useful services and make informed decisions; foster a national private sector workforce that can thrive in a data-driven economy; and support well-informed citizens in a data-rich society. The size of the public sector workforce and government's ability to lead by example means its internal and external initiatives can have a big impact. The government's pledges, in the NDS, Plan for Growth, [Integrated Review](#) and National AI Strategy, show it is committed to improving data literacy.

But, as this report shows, the different overlapping 'literacies' – such as digital and media literacy – which lack clear, consistent definitions, mean the government is at risk of work being fragmented, duplicated and unaligned, although 'data literacy' is foundational to many of them. Some of these literacies, such as 'digital literacy', tend to focus more on the technical and practical skills on the right-hand side of the ODI Data Skills Framework, rather than the more critical, contextual and strategic 'literacy' topics on the left-hand side.

There is no consistent definition of 'data literacy' across government, which reflects debates in academia and elsewhere. There is some recognition that 'literacy' means more than just technical, analytical and engineering skills, and that everyone – not just data specialists – needs some degree of data literacy. The AI Roadmap, from the independent, advisory AI Council, has a particularly interesting, holistic view of literacy for all sitting alongside specialists skills for some and greater diversity in data-focused professions.

Government's internal offering of courses and resources on data literacy – especially those brought together by the GSCU and the Analysis Function – covers a lot of the more strategic and contextual skills on the left-hand side of the ODI Data Skills Framework, and engages the different levels of the ODI Levels of Data Literacy. But there is a risk that some things offered by specific professions, and to particular levels of officials, could be of wider use. The internal offering is more extensive than many of government's external initiatives, which focus on more technical skills.

Overall, for all the apparently good work going on in government, there remains greater focus on the technical skills of the right-hand side of the ODI Data Skills Framework than the more contextual literacy of the left-hand side. This also means that there can sometimes be a focus on the higher levels of the ODI Levels of Data Literacy, rather than data literacy for all, as per the ODI's definition of data capability.

Several issues remain that need to be tackled.

The first is the lack of definitions around 'data literacy' and the other, overlapping types of 'literacy'. Something like the ODI Data Skills Framework (with its hexagons of different topics) and the ODI Levels of Data Literacy (with its different levels) could help give some shape to this – helping to disentangle some of the specific areas, spheres or skills involved – as could the NDS commitment to publish a definition. Some guide to how the various other overlapping literacies relate to foundational data literacy and how the government thinks they all intersect would also be helpful. This might also help develop more focus on the importance of data literacy for individuals as citizens, rather than just as workers: most current initiatives tend to revolve around the workforce (the 'data-driven economy', as the NDS puts it) rather than society (the 'data-rich lives' that the NDS also considers important).

This could help with the second issue – the risk of fragmentation, duplication and lack of awareness of different work across government. The GSCU has done an excellent job of trying to pull together different resources from across different professions and functions – but inevitably, there will be individual departments and other public sector organisations developing resources which could be of wider use. Making all the resources even easier to find and access – perhaps grouped under a 'data literacy' heading – will make them easier for people to use and integrate into their own training plans.

The disconnection is particularly acute when it comes to the government's public-facing data literacy work. The resources and training offered inside government feels more extensive than many of the current external initiatives. It may also be that some internal resources and training materials are only available to certain professions, and not more widely. There may be understandable reasons for this – it costs money to develop resources like the Data Masterclasses, there may be licensing issues, and partial offerings (for example, videos and quizzes but not the experience of shared learning with a wider cohort) may not be as good as the full offer. But increased openness about the materials available, within government and to the wider population, could be of real benefit and support government's ambitions for data literacy for the wider population and workforce.

# Annex

## Public sector data literacy initiatives for government

- Government Curriculum and Campus from the [GSCU](#): see [Better Training, Knowledge and Networks: the New Curriculum and Campus for Government Skills](#)
- The [Analysis Function](#), including its [learning curriculum](#), [functional standard](#), and [Analysis in Government Month](#)
- The [Government Statistical Service](#), and its [courses and resources](#)
- The [Digital, data and technology](#) profession, with links to [various GDS Academy courses](#)
- The Government Knowledge and Information Management Profession, and [its document on continuing professional development](#)
- [Government Economics Service](#)
- [Government Social Research Service](#)
- [Policy profession](#), and its [competency framework](#) and [training prospectus](#)
- ONS Data Science Campus (previously GSCU and 10DS), [Data Masterclasses for Senior Leaders](#) (more in [this presentation](#), [this blogpost](#) and [this blogpost](#))
- NHS England and Improvement, '[Making Data Count](#)' initiative
- The [Government Data Quality Hub](#), including a [data quality framework](#), training course on the basics of [data quality](#), a [maturity framework](#), and (with Data Standards Authority) [DataConnect21](#)

## Public sector data literacy initiatives for others

- Provision by the government-backed [Data Skills Taskforce](#), including a [data skills self-assessment portal](#) or tool and an [online course for leaders](#)
- A DCMS and OfS pilot testing [how 'foundational' data skills are being taught to undergraduates](#) (an extension of work on [postgraduate conversion courses](#) for AI and data science)
- DCMS, [Online Media Literacy Strategy](#)
- Department for Education, [Skills Bootcamps](#)
- DfE and Office for Students, [piloting data-centric short courses under the Lifelong Learning Entitlement](#)
- DfE, [Essential Digital Skills Framework](#)
- ICO, [Your Data Matters](#)
- Ofcom, [Making Sense of Media](#)
- The [Data Lab](#) (Scotland), [Data Skills for Work](#)

## Stakeholder engagement

We are very grateful to those who participated in stakeholder interviews and/or reviewed drafts of this work, including representatives of:

- Analysis Function
- Central Digital and Data Office
- Civil Service Modernisation and Reform team
- Data Skills Taskforce
- Department for Digital, Culture, Media and Sport
- Government Skills and Curriculum Unit
- NHS Transformation Directorate
- Office for National Statistics Data Science Campus
- Office for AI

We are also grateful to those who provided other suggestions and links to previous relevant work.