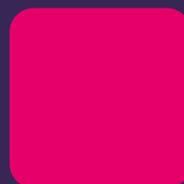


Data & AI Skills Framework



About The Data Lab

www.thedatalab.com

Founded in 2014, The Data Lab is Scotland's innovation centre for data and AI, hosted by the University of Edinburgh and part of the National Innovation Centre Programme funded by the Scottish Funding Council.

Our vision is to foster a more prosperous and equitable society where the responsible use of data and AI empowers everyone to thrive. Through hubs in Edinburgh, Glasgow, and Aberdeen, we foster innovation through collaboration, build skills and grow talent, and champion Scotland's data and AI community.

We are a supporting vehicle to drive innovations and promote connections across all sectors, connecting industry, non-profits, the public sector and universities and colleges. To date, we have funded over 1000 MSc scholarships, providing industry placements for over half, created and safeguarded over 1500 jobs, and generated £212 million additional revenue through collaborations with academia and industry. We are central to Scotland's data and AI ecosystem, connecting individuals and organisations through events and our digital community, which has over 6,500 members globally.



About Data Skills for Work

The Data Skills for Work project is part of the Edinburgh & South East Scotland City Region Deal Data Skills Gateway Programme, funded by the Scottish and UK Governments. The Data Skills Gateway brings together industry, universities, colleges, schools and others to provide routes into data or digital careers.

The ambition of Data Skills for Work is to ensure that our wider workforce has a broader set of skills to help people at every level understand and creatively solve problems using data and develop a foundational understanding of AI.



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Introduction

Scotland's digital economy has experienced significant growth in recent years, establishing itself as a dynamic hub for technological innovation and digital adoption. The Scottish tech ecosystem contributes approximately £4.9 billion in Gross Value Added (GVA)¹ to the economy. Over 10,000 tech companies operate in Scotland, spanning fintech, AI, cybersecurity, and digital health. Tech clusters in Edinburgh, Glasgow, and Aberdeen as well as TechScaler and CivTech support startups and scale-ups.

Scotland's Digital Economy Skills Action Plan (2023-2028)² emphasises the importance of equipping the workforce with the necessary digital competencies to support Scotland's economic vision. Despite advancements in digital education, challenges persist, particularly concerning data skills, the adaptation of AI technologies, and with regards to regional disparities.

In 2020, The Data Lab commissioned research into data skills in Edinburgh and Southeast Scotland for the Data Skills for Work project, funded through the Edinburgh City Region Deal as part of the Data Driven Innovation Data Skills Gateway. The [2020 Research Report](#)³ summarises that while employers began to see the potential and importance of data and AI skills, they felt that their wider workforce was insufficiently prepared to meet current and future skills demand.

They also faced significant barriers to accessing training in a fragmented skills provision landscape. The lack of flexible and sector-specific training interventions was especially noted. As a key output of the research, the 2020 Data Skills Framework first introduced the four Data Personas and corresponding themes and skills.

The [Data Skills Gateway](#) develops skills programmes that provide learners at every stage of their data and AI journey, from school age 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.

Through [Data Skills for Work](#) we have upskilled over 1,300 individuals to increase the number and diversity of workers required to fill the growing regional and national demand for people with the relevant skill sets to undertake both intermediate and professional data roles.

1 A Changing Nation – how Scotland will thrive in a digital world: progress report 2021-2024: www.gov.scot/publications/changing-nation-scotland-thrive-digital-world-progress-report-2021-2024/

2 Digital Economy Skills Action Plan 2023-2028: www.skillsdevelopmentscotland.co.uk/media/pq5fwkcb/digital-economy-skills-action-plan.pdf

3 Developing a Data Journey: dataskillsforwork.com/news-database/developing-a-data-journey

Data & AI Skills Assessment

Data and AI requirements in the workplace have changed substantially since the Covid-19 pandemic. At the same time, access to international data and AI talent was directly impacted by the United Kingdom's exit from the European Union.

The Data Lab undertook a new round of research in 2024 to assess:

1. the current state of data and AI skills in all Scottish regions;
2. employers' future outlook on data and AI skills;
3. their training needs and barriers to upskilling;
4. the impact of Brexit and the pandemic on data and AI skills across Scotland; and
5. how diversity and inclusion is reflected in training and hiring for data and AI talent.

The new study comprises comprehensive and representative quantitative and qualitative data from all Scottish regions. We engaged the public via online surveys and focus group discussions between October and December 2024. A forthcoming report will highlight the findings of this research in more detail and make recommendations for action.

Key takeaways of the research are:

- There is still a significant data and AI skills gap across Scotland which is more pronounced outside of the Central Belt and for small businesses.
 - Employers rate their organisation's data and AI literacy as moderate to low.
 - Employers have a relatively good understanding of their data needs, but little understanding of their AI needs.
 - Only one quarter of surveyed organisations have a data strategy.
- Organisations lack clarity on future data and AI skills needs, although cybersecurity and data privacy are emerging priorities.
 - Micro and small organisations in particular don't usually have specialised data and AI roles or skills in house and are not looking to upskill.
 - Data and AI skills are not seen as business critical.
- Most organisations have an awareness of AI and its potential benefits but struggle with practical applications.
- Data and AI ethics and governance are sought after to enable ethical and transparent use of technologies at all levels of organisations.
- Senior leaders are mostly in charge of making decisions about data and AI usage, but their understanding and level of data literacy varies. More than having technical skills, they need to be able to develop a vision for data usage within their organisations.

We used the findings of our data collection to develop a comprehensive **Data & AI Skills Taxonomy**. It groups required skills that were highlighted in the research into key competencies and describes literacy for each at foundational, intermediate and advanced level. This taxonomy and the 2020 Data Skills Framework are the basis for our new 2025 Data & AI Skills Framework.

Data & AI Framework – Rationale and Competencies

The 2025 Data & AI Skills Framework adopts a skills-for-employability approach. This methodology focuses on bridging skills gaps, providing a flexible pathway for individuals to enhance their competencies across various levels of data literacy and AI understanding. By prioritising skills development over specific job titles, we aim to equip individuals with the capabilities required in a rapidly evolving technological landscape.

In an educational and employability context, this framework can be applied to create targeted training pathways and the taxonomy includes sector-specific pathways to address unique industry needs in Scotland, such as public health, finance, and renewable energy. For instance, a university or college course could start with foundational data literacy, progressing to advanced analytics. Similarly, professional development programs in Scotland's renewable energy sector could integrate AI ethics and data management to address local industry needs.

The Framework is defined across four Data and AI personas, which align with levels of data literacy in key competency areas.

 **Data & AI Citizen** –
foundational level data and AI competencies

 **Data & AI Worker** –
intermediate data and AI competencies

 **Data & AI Professional** –
advanced data and AI competencies

 **Data & AI Leader** –
strategic data and AI competencies

These four Data and AI Personas are defined by **key competencies** that we identified in the 2024 research: technical skills, data and AI ethics, meta-skills and leadership skills. These key competencies are further defined by corresponding knowledge and skills, making it easy to understand and assess differences in literacy levels.

Technical skills form the foundation of the 2025 Data & AI Skills Framework, including data analysis, data visualisation, programming, machine learning (ML) and AI, data management, data quality, data storytelling and cybersecurity. These skills are essential across all personas and ensure that individuals are equipped to handle the technical demands of the field.

In addition to technical skills, the framework emphasises the importance of Data and AI **ethics and governance**. Understanding bias, privacy, ethical and legal implications is crucial for responsible AI deployment and effective data management.

Meta-skills play a crucial role in personal development within data and AI careers. Meta-skills⁴ are skills that help individuals adapt, learn, and navigate complex environments. These skills, including communication, critical thinking, adaptability to rapid changes in technology and problem-solving, are integrated across all personas to enhance an individual's ability to adapt and innovate, providing a solid foundation for lifelong learning.

Leadership skills are important because digital transformation is not just about technology – it's about people, processes, and culture. Strong leadership ensures that digitalisation efforts are strategically aligned, well-executed, and embraced across an organisation and within societies.

4 Skills Development Scotland Meta-Skills Progression Framework:
www.skillsdevelopmentscotland.co.uk

Table 1: High level presentation of competencies per Data & AI Persona

Competency	Data & AI Citizen	Data & AI Worker	Data & AI Professional	Data & AI Leader
Technical skills	Data analysis		Advanced analytics	
	Database management		Database design	
	Awareness of ML/AI	Understanding of ML/AI	Development of ML/AI	Strategic AI implementation
		Introduction to Programming and Scripts	Full stack development	
	Data quality management		Data evaluation	
		Data visualisation		
		Data storytelling		Strategic storytelling
		Cyber threat management		Cybersecurity best practice
Data and AI ethics and governance	Ownership and accountability			
	Privacy and compliance			
		Understanding bias and ethical implications		
Meta-skills	Communication and team collaboration		Strategic communication and influencing	
		Problem-solving and creative thinking		
	Adaptability		Resilience and systems thinking	
Leadership skills	Basic project organisation	Project Management	Programme management	Planning strategic innovation
		Data-driven decision making		
			Alignment of systems with organisational strategy	
			Managing and developing a data team	
		Managing change in data projects		Leading systemic change

The framework emphasises the importance of foundational skills to establish a strong base in data and AI. These skills equip learners to navigate and leverage data effectively, setting the stage for more advanced studies and professional roles. Focusing on data and AI ethics and governance as part of strategic development equips individuals to tackle ethical implications, bias mitigation, and responsible AI deployment.

Characterisation of Data & AI Personas

The 2025 Data & AI Skills Framework presents a comprehensive spectrum of capabilities within each persona, showcasing both overlap and progression across literacy levels. Each persona – from Data & AI Citizen to Data & AI Leader – follows a consistent skills progression across foundational, intermediate, and advanced levels, ensuring clear pathways for growth. This structure allows individuals to build on existing knowledge as they advance their skillset, ensuring flexibility and adaptability in their career journeys.



Data & AI Citizen

Develops basic proficiency in data and AI, including understanding data concepts and ethical awareness.



Data & AI Worker

Gains skills in data analysis, programming, and ethical considerations to handle complex data tasks.



Data & AI Professional

Advances in data analytics, machine learning, and data governance to lead innovative AI solutions.



Data & AI Leader

Focuses on strategic data governance and ethical AI leadership to drive organisational change and innovation.

By emphasising a skills-based approach, we ensure that individuals can adapt to diverse roles, fostering a workforce that is resilient and well-prepared for future challenges. This approach facilitates continuous learning and career development, making it more responsive to industry changes than a narrow role-based strategy. The framework includes and offers upskilling pathways to support employability at each level of data literacy.

Data & AI Citizen

The Data & AI Citizen illustrates individuals at the foundational level of data and AI literacy. This persona focuses on developing an understanding of basic data concepts and the impact of AI in everyday life. As Citizens, this level will explore the ethical dimensions of data and AI use, learning how to manage and interpret data with simple tools. This foundational level prepares them to interact effectively with data and AI in personal and professional settings.

Competency	Foundational literacy	Intermediate literacy
Data literacy	Understanding basic data concepts Basic data sources and types	Interpreting simple data sets Recognising data quality issues
AI awareness	Understanding the impact of AI in daily life	Recognising AI applications and limitations
Data & AI ethics	Ethical awareness, recognising bias	Understanding ethical implications
Data management	Basic data handling and storage best practices	Simple data entry and retrieval
Tools and technology	Basic skills in spreadsheets (Excel, Google Sheets)	Using simple data tools for visualisation
Meta-skills	Effective communication of basic data insights	-

Data & AI Citizen Employability Pathway

- 1 Understanding basic data concepts:**
Gain familiarity with common data sources and the importance of data in society.
- 2 AI awareness:**
Learn how AI is integrated into everyday technology and its potential impacts.
- 3 Ethical awareness:**
Recognise ethical implications and biases in data use.
- 4 Data handling skills:**
Acquire skills for basic data entry, organising, and storage.
- 5 Technology use:**
Develop proficiency in using basic data tools like spreadsheets for simple analysis and reporting.
- 6 Meta-skills:**
Enhance abilities to communicate data findings effectively within a team or community setting.

Data & AI Worker

The Data & AI Worker builds on the Citizen’s foundational skills, moving towards a more intermediate level of data and AI literacy. Workers are equipped to handle data analysis, programming, and ethical considerations. Through practical applications, they contribute to data projects and enhance business operations using AI tools. By developing these skills, Workers effectively collaborate within teams, supporting more complex data tasks.

Competency	Foundational literacy	Intermediate literacy
Data literacy	Basic data handling and reporting	Data analysis and visualisation
Programming	Simple scripting	Data manipulation (Pandas, NumPy)
Data & AI ethics	Awareness of privacy, data ethics, recognising bias and limitations	Privacy and compliance assessment, analysing ethical impacts and biases in models
Data management	Basic database querying	Handling structured data
Tools and technology	Basic use of data tools and AI technologies	Ability to interpret and present data findings effectively using visualisation tools
Meta-skills	Team collaboration	Project-based communication

Data & AI Worker Employability Pathway

- 1 Basic data handling and reporting:**
Understand the fundamentals of data collection and reporting.
- 2 Tools and technologies:**
Gain familiarity with AI tools and the basics of data preparation for AI.
- 3 Intermediate data analysis:**
Develop skills in data analysis and visualisation techniques.
- 4 Programming skills:**
Gain proficiency in simple scripting and data manipulation.
- 5 Ethical and privacy considerations:**
Understand data and AI ethics and assess privacy compliance.
- 6 Meta-skills:**
Develop team collaboration and project-based communication skills.

Data & AI Professional

The Data & AI Professional operates at an advanced level of data literacy, leading innovative AI solutions. With expertise in advanced analytics, machine learning, and data governance, Professionals drive transformative projects. They focus on implementing robust AI models and ensuring ethical practices. This role is crucial for organisations aiming to harness the power of data for strategic decision-making.

Competency	Foundational literacy	Intermediate literacy	Advanced literacy
Data literacy	Understanding datasets	Advanced data analytics	Predictive modelling
Programming	Intermediate Python/R skills	Data manipulation with advanced libraries	Full-stack development
Machine learning	Familiarity with ML concepts	Implementing models, model evaluation	Deep learning
Data & AI ethics	Ethical data use	Audit and compliance	Ethical AI frameworks
Data management	SQL querying	Database management	Data governance and lifecycle management
Cybersecurity	Recognising basic threats	Network security fundamentals	Advanced threat management
Meta-skills	Collaborative project skills	Project management techniques	Leading innovation

Data & AI Professional Employability Pathway

- 1 Advanced data literacy:**
Master advanced data analytics and predictive modelling.
- 2 Programming proficiency:**
Acquire skills in advanced programming languages and libraries.
- 3 Machine learning implementation:**
Implement and evaluate machine learning models.
- 4 Ethics and compliance:**
Ensure audit compliance and develop ethical AI frameworks.
- 5 Data management expertise:**
Excel in database management and data governance.
- 6 Cybersecurity awareness:**
Enhance skills in threat management and network security.
- 7 Leadership skills:**
Build project management techniques and lead innovative initiatives.

Data & AI Leader

The Data & AI Leader embodies strategic advocacy for data and AI, guiding organisations through transformative change. Leaders are responsible for developing and implementing data-driven strategies and fostering a culture of ethical AI deployment. By aligning technological advancements with organisational goals, they ensure sustainable growth and innovation, positioning their organisations at the forefront of the data and AI economy.

Competency	Foundational literacy	Intermediate literacy	Advanced literacy
Leadership and strategy	Strategic data awareness	Data-driven decision-making	Leading data strategy and innovation
Data & AI ethics	Understanding ethical impacts of AI	Developing governance frameworks	Establishing ethical AI guidelines
Technical skills	Foundational understanding of data and AI concepts and tools across different levels with knowledge of relevant terminology to enable leadership of cross-functional teams		
Data management	Basic understanding of data architecture and governance	Overseeing data integrity	Strategic data governance
Meta-skills	Strategic storytelling with data	Leading teams	Cross-functional collaboration and change management

Data & AI Leader Employability Pathway

- 1 Strategic data awareness:**
Develop a strategic vision for data within the organisation.
- 2 Decision making:**
Lead data-driven decision-making processes.
- 3 Leadership and strategy:**
Formulate and drive strategic data initiatives and innovation.
- 4 Ethical leadership:**
Establish and uphold ethical AI guidelines and governance frameworks.
- 5 Data governance oversight:**
Manage strategic data governance and ensure data integrity.
- 6 Communication and collaboration:**
Lead cross-sector collaboration and change management.

How to use the Framework

Our framework is more than a guide – it's a tool for individuals, organisations and skills training organisations to navigate future workforce development.

Anyone can use the framework to:

- Understand skills required for different data and AI roles including ethical and governance considerations as well as leadership and meta-skills.
 - Assess their current data and AI skills level.
 - Understand how to improve their data and AI skills through continuous learning.
-

Organisations and teams can use the framework to:

- Identify data and AI skills capabilities in their teams and align them with strategic goals.
 - Forecast their workforce skills needs to enable relevant training opportunities.
 - Create relevant and consistent job adverts.
 - Ensure effective data management practices.
-

Educators can use the framework to:

- Identify data and AI skills gaps and develop curricula based on data and AI literacy levels.
- Prepare learners for diverse and evolving career pathways.
- Emphasise continuous learning and adaptability.

The framework offers individuals, organisations and educators a roadmap to assess and enhance their data and AI competencies.

Here's how you can make the most of it:

1. Identify your Data & AI Persona

Start by identifying where you, your team or organisation currently fit within the framework. Are you a Data & AI Citizen, Data & AI Worker, Data & AI Professional, or Data & AI Leader? Each persona has tailored skills, so recognising your current level will help you focus on the most relevant areas for improvement that align with your personal goals or organisational strategy.

2. Focus on competency areas

The framework is structured along four competencies: technical skills, ethics and governance skills, meta-skills and leadership skills. Starting from your current Data & AI Persona, the framework guides you to other personas through building skills along the core competencies.

To become a...

Data & AI Citizen:

Reflect on where and how you generate, manage, store and use data. Explore where you interact with AI applications. Think about how data can be mis-used and what you can do to protect your private data.

Data & AI Worker:

Focus on building on your data analysis and foundational AI skills and getting comfortable with visualisation tools. Learn about the ethical and legal sides of data handling and AI adoption, this will help you tackle more complex projects.

Data & AI Professional:

Enhance your data analysis and visualisation skills by learning a programming language and using data to create compelling stories. Deepen your understanding of the practical applications of AI within your sector. Explore advanced concepts such as data governance and privacy and learn how to handle cyber threats.

Data & AI Leader:

Become a champion for data-driven decision making and lead your organisation in implementing data and AI strategies to boost economic growth. Familiarise yourself with key data and AI concepts and build the skills to guide cross-functional teams. Develop your leadership skills to shape data strategies, foster a data-positive culture and champion ethical deployment of AI.

3. Set a learning path

There are a wealth of training offers out there, such as online courses, workshops, certifications, or mentorship. Setting short-, mid- and long-term goals will help you to stay focused in your upskilling journey.

Short-term goals:

Identify and complete a relevant training course and engage in a hands-on project.

Mid-term goals:

Use data often to inform your thinking and decision making. Find a mentor or advisor to support your data and AI career journey and create accountability.

Long-term goals:

Pursue a certification, take on a leadership role in data-driven projects, use data to develop a strategy.

4. Track progress and expand your role

As you acquire new skills, track your progress and set new challenges to expand your role. For example, a Data Worker could evolve into a Data Professional by mastering advanced data science techniques or moving into leadership roles.

Join The Data Lab's Community – a network and online hub that provides a collaborative space for connection, growth, and learning where you can tap into expertise and share your journey.

To keep in touch with The Data Lab and our community – including events and news and the forthcoming report the 2025 Data & AI Skills Taxonomy sign up for our newsletter here:

www.thedatalab.com

And to receive a copy of the report or find out more about our Skills Taxonomy, contact us at:

skills@thedatalab.com

Don't forget to keep on learning!



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