Study of data and digital skills for all non-IT roles across multiple industries.

Foreword

Mary Buckley
Executive Director, IDA Ireland

Ireland's talented workforce continues to be a key driver in attracting foreign direct investment to Ireland. As digitalisation transforms all aspects of our economy and society, maintaining and developing digital skills will be central to the continued success of our economy, our enterprise base, and our people.

This study examines the digital and data skills for all non-IT roles, that are becoming widespread across multiple industries as companies adopt new technology to drive efficiency, innovation, and enhance customer experience. Industry leaders from digitally advanced companies in Ireland have provided insights into how they are developing core digital and data skills across their organisations and creating a culture conducive to successful digital transformation.

The findings indicate a great deal of commonality across roles, regardless of industry, reinforcing the requirement for all employees to be digitally literate, and the criticality of supporting our current and future workforce to develop these fundamental life skills. The study also identifies the key role leaders play in workforce skill development and in creating an organisation comfortable with technology, data, change, and lifelong learning.

On behalf of IDA Ireland, I want to thank all the companies who have generously given of their time, expertise, and insights to this report. I also want to acknowledge Skillnet Ireland for their partnership and support in bringing this report to a successful conclusion.

We look forward to using the findings of this report as a basis to work with our stakeholders in continuing to develop world class talent armed with the skills fundamental to sustaining Ireland's economy and society into the future.

Mark Jordan
Chief Strategy Officer of Skillnet Ireland

Digitalisation, and the ability to work with data has become an increasingly central requirement for all businesses. Ensuring Ireland's FDI enterprises have a strong, digitally resilient, and sustainable talent pipeline capable of adapting to the changing demands of digitalisation is a key priority for Skillnet Ireland and IDA Ireland.

Working together with enterprise, both agencies are designing supports for businesses to ensure that they and their staff are ready for the digitalisation challenges of the future. Framed within the context of an ever-changing digital landscape, the aim of this report was to examine the data and digital requirement of non-IT employees and to ensure a talent pipeline now and into the future.

Evidence suggests that digitally literate companies are more competitive, introduce more innovative products, and are better equipped for the future. Central to this is the role that business leaders will play in spearheading and role-modelling a data driven culture so that everyone feels comfortable working with data and utilizing digital tools.

We strongly encourage all of our stakeholders to consider how they can begin implementing a digital talent strategy within their own organisations and developing the skills and competencies needed to futureproof your businesses and strengthen Ireland's economy.

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Executive summary

The demand for data and digital skills within Ireland's key industries is rapidly increasing as technology advances and more organisations seek to digitalise. Although Ireland currently ranks 5th of all European Union member states in the overall Digital Economy and Society Index (DESI), strengthening our citizens' data and digital literacy needs further prioritisation.

To date there has been no single study of data and digital skills required for non-IT roles across multiple industries in Ireland. Much of the existing analysis refers to broad areas of competence, high-level ICT skills (National Skills Council 2019), basic entry-level digital skills (e.g., email, online searches) (European Commission 2022), or technical roles. This study's level of granularity makes it novel as it explores FDI industry leaders' views, supplemented with desktop research and insights from subject matter experts on the data and digital skills required for non-IT roles now and in the next 3-5 years.

This study aims to address the information gap. That is, to determine the specific data and digital skills non-IT employees need now and will need in the future.

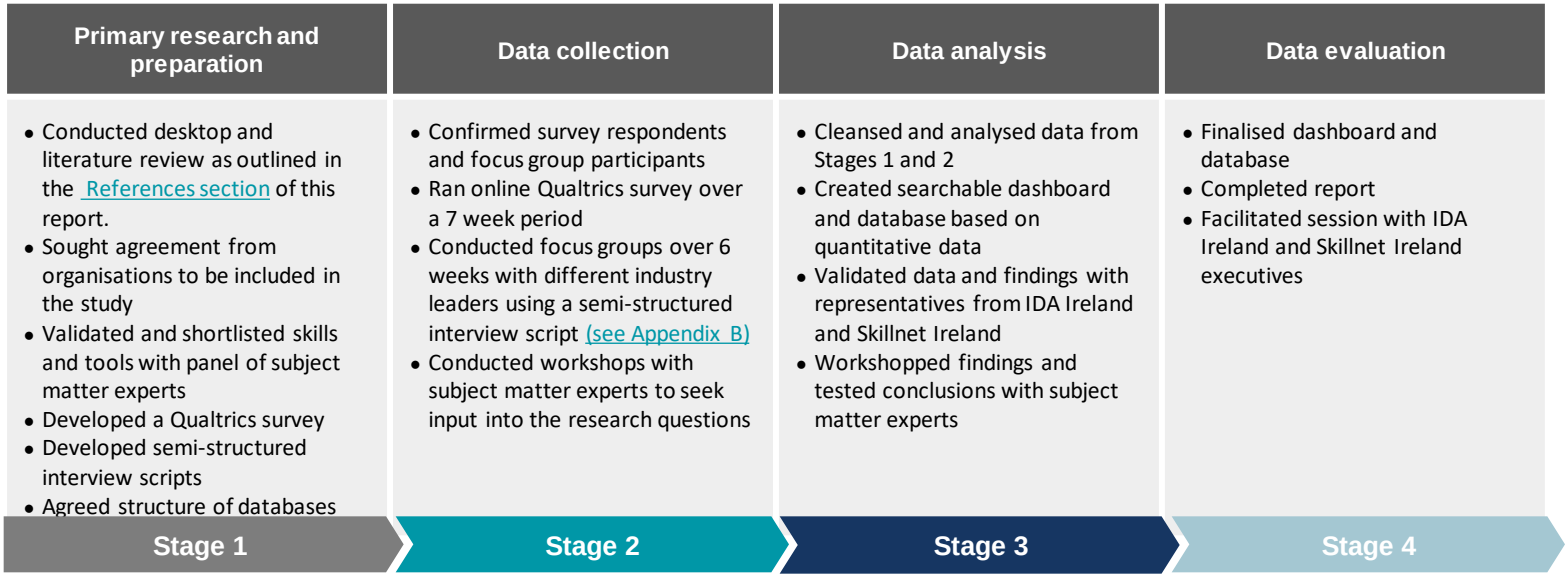
Primary data was gathered through detailed focus group discussions with **36 industry leaders representing 13 global, digitally transformed organisations**. An anonymous online **survey was completed by 108 industry leaders** representing a spectrum of functions and industry types. The findings from that process were tested in workshops with 15 subject matter experts.

The findings indicate significant overlap in the core data and digital skills required for non-IT roles across Pharmaceuticals, Medical Technology, Engineering, Technology, International Financial Services and Consumer and Business Services. It is clear how data and digital skills will become fundamental for all workers, IT or non-IT, as digitalisation of industry progresses. Data and digital literacy will sit alongside core and numerical literacy as fundamental life skills. Consequently, school leavers, non-IT graduates and employees need more support to develop these skills which will in turn support the digital transformation and sustainability of organisations including and ranging in scale from indigenous SMEs to FDI enterprises in Ireland.

This report is intended to be read in conjunction with the 'Glossary of terms' document which defines various terms used throughout.

Executive summary

Below is a high-level summary of the methodology and approach, this is discussed in more detail on page 14:



Limitations

The findings here need to be understood as a reflection of the views of the senior leaders who had input into this study. Th ey cannot be generalised to all industries, functions and organisations within each of the sectors considered. However, they provide a baseline study of the skills which industry sees as priority now and for their future workforce.

Executive summary

High-level findings in relation to key stakeholder groups:

Employers

It is clear that in the next 3-5 years, an increased proficiency level is required for people working in non-IT roles in the following core skills: data (input, analysis, validation, manipulation and visualisation), digital problem solving, document design and presentation, digital communication and collaboration as well as the ability to work confidently with digital technologies. Targeted talent development strategies will help to ensure no one gets left behind. Additionally, employers would benefit from proactively building an organisational culture that reflects the hallmarks of a digitally transformed organisation discussed on page 12.

Leaders

Leaders overseeing non-IT functions play a key role in data and digital skill development and it is therefore critical that they role-model proficiency and comfort with data and digital skills and tools. Furthermore, leaders who actively create a culture that is data-driven and values lifelong learning are best placed to successfully manage their teams through digital transformation.

Educators and trainers

School leavers and graduates are more comfortable with technology than ever before. And yet, few enter the workforce with experience in widely used tools in industry or the skills to use data to problem-solve. They therefore require additional support to develop proficiency in these areas. Microcredentials and short, online courses directly relevant to the workplace were highly regarded by industry. Another key finding was that foundational skills such as basic numeracy, statistics and digital skills are necessary for the data and digital skills identified by industry. As such, structures need to be in place long before people leave school to develop and build upon these skills.

Employees

Employees are encouraged to experiment with technology and regard mistakes as opportunities to learn, realise the importance of lifelong learning and seek to upskill on a regular basis whilst avoiding the temptation to assume that past education and / or extensive work experience will equip them for the future of work. Transversal skills such as resilience to change, an appetite for lifelong learning, and having a digital mindset are key to developing core data and digital skills.

Section 1: Introduction

Policy context and background

Ireland holds a reputation as a "digital leader" (Government of Ireland 2022), currently ranking 5th in the 2022 European Commission DESI report. The Irish education system is in the top 5 of 14 European Union countries. While Ireland has ambitious targets to "increase the share of adults with at least basic digital skills to 80% by 2030" (Department of Education 2022), further strides need to be made to improve core data and digital skills and address the reported difficulties in attracting talent (Skillnet Ireland 2023b).

The importance of digital skills is a well documented research area with the following International, European, and National publications exploring the topic:

- World Economic Forum Future of Jobs Report (World Economic Forum 2023)
- European Year of Skills (European Commission 2023)
- Digital Europe Programme (European Commission 2021)
- OECD Skills Strategy Ireland (OECD 2023)
- Harnessing Digital (Government of Ireland 2022)
- The Digital Strategy for Schools to 2027 (Department of Education 2022)

Global megatrends such as technological advancement, globalisation, automation and climate change are transforming the socio-economic landscape, in particular the labour market and the economy.

The digital transformation of industry has been at the forefront of this change in the socio-economic landscape and has impacted the skills required across industry.

> *"**Digital transformation** is the adoption of digital technology by an organisation to digitise non-digital products, services or operations. The goal for its implementation is to increase value through innovation, invention, customer experience or efficiency."*
> (Aslanov and Mirzagayeva 2022)

Increasingly, data literacy and digital fluency are viewed as core skills required in every business function. There is a growing need for data and digital skills in non-IT roles to leverage technology and data for problem solving, enhanced decision making, increased productivity and automation.

Enabling the successful digital transformation of enterprise and realising the benefits of that transformation, requires a capability uplift in data and digital skills.

The demand for and importance of data and digital across industry is clear, what is less clear is the specific digital and data skills and the level of competence required for non-IT workers in industry.

Policy context and background

As the pace of digital innovation intensifies, Artificial intelligence (AI) presents challenges as well as opportunities for how it will impact the future of work and signals a shift in the digital skills demanded by organisations for the future workforce. Generative AI tools have more recently been trained to carry out complex data processes.

Against the backdrop of rapid technological advancement, it is more likely that the workforce of the future will require data and digital skills that are less focused on the manual processing side of data and more so on the ability to take a data set and tell its story to derive insights and actions. In addition, recent findings suggest that advanced digital skills such as AI application and development, and AI implementation will be in much higher demand in the near future (LEADS 2023).

Ireland's National AI Strategy aims to ensure that Ireland is best placed to leverage all that AI has to offer. Its strategy is three-pronged: adopting a human-centric approach to the application of AI, not fearing its potential and lastly, putting clear governance structures in place to ensure ethical and responsible leveraging of the technology (Department of Enterprise, Trade and Employment 2021).

As technological advancements continue to reshape industries and economies, it is more important than ever that FDI in Ireland is positioned in line with capturing future growth (IDA Ireland 2022).

Report objectives, rationale for the study and audience

This study, conducted by IDA Ireland and Skillnet Ireland, aims to analyse the data and digital skills required across IDA Ireland's industry sectors in the digital future of work.

The report presents the data from a bespoke study designed to answer the research questions below:

- **What are the specific data and digital skills required in non-IT roles across ireland's key industries?** The skills that all workers, regardless of their role, will need over the next 3-5 years and beyond to work effectively with digital technology and data.
- **Does industry consider school-leavers, graduates and employees as having these fundamental data and digital skills?**
- How applicable is the **current data and digital training and education provision** to the needs of industry and to building future capacity in these core skill areas?

Rationale for the study

There is an **information gap on the data and digital skills for non-IT** functions across industries. This study aims to redress that gap, supporting the digital transformation and sustainability of FDI in Ireland by providing intelligence on the specific data and digital skills employees need now and for the future.

Who is this report for?

- **Industry leaders** wanting to understand what skills their non-IT workforce will need in the medium term.
- **Small and medium enterprises** wanting insights into how digitally transformed industry leaders approach skill development and digitisation.
- **Educators and trainers** interested in industry insights into skills and training gaps amongst school-leavers, graduates and employees.

High-level findings and report structure

Industry leaders across FDI industries identified the following skills as requirements for all non-IT roles:

- **Data skills** (input, analysis, validation, manipulation and visualisation)
- **Digital problem solving**
- **Document design and presentation**
- **Digital communication and collaboration**

Building and maintaining these skills relies on transversal skills such as resilience and openness to change, a **commitment to lifelong learning**, and a **digital mindset**.

Developing these skills depends on having basic numeracy, and digital literacy. These ideally need to be in place before an individual enters the workforce or completes their formal education.

Another key finding is that there are opportunities for leaders to:

- Future-proof their workforce by adopting a 3-5 year view of skill development, aligned to digitalisation goals.
- Effectively lead their workforce through change and create a culture that values data-driven decisions and embraces embraces early adoption of new technologies to drive innovation and enhance the customer experience.

> ***"Leading companies set out to shape their future by servicing a more ambitious and relevant purpose and fundamentally rethinking the system of capabilities that allows them to deliver on that purpose."***
> (Leinwand et al 2022)

Report structure

The report is structured as follows:
Section 1 outlines the overall policy context and rationale for the report.
Section 2 discusses the Methodology and approach.
Section 3 discusses the Findings in relation to the three research questions.
Section 4 outlines the Conclusions and recommendations.

Hallmarks of digitally transformed organisations in this study

An interesting feature of this study is it reflects the views of leaders in digitally transformed organisations across FDI industries. Some of the **hallmarks of digitally transformed organisations** are captured in the following excerpts from industry leaders consulted:

Data Driven

"We make decisions based on data" "Nothing happens without it being measured"

Focus group participant

Lean

"We are deliberate about digitising"

Focus group participant

Committed Leaders

"There needs to be a leadership commitment to driving the digital agenda"

Focus group participant

Proactive

We are proud of our "can do attitude: the more you know, the more you can do yourself"

Focus group participant

Talent Driven

We focus on "tapping into untapped potential"

Focus group participant

Responsive

"We never had to push or make people want this…this is where the world is bringing us"

Focus group respondent

Innovative

"We like people visiting and learning from us"

Focus group participant

Knowledge Driven

"An appetite for learning is really important"

Focus group participant

Section 2: Methodology and approach

Deeper dive into methodology and approach

Desktop research and policy review

A comprehensive desktop review was conducted to assess the policy context relevant to the study and to arrive **at a long-list of data and digital skills, tools, and tool types across industries** represented in the study. The long list of skills and tools was developed in tandem with industry subject matter experts drawing on their knowledge of industry standards. This was then refined based on which tools are most widely available. Bespoke tools or those created in-house by organisations were excluded. This research informed the approach to the online Qualtrics survey and the semi-structured interview script for focus groups.

Inclusion criteria

There were two main inclusion criteria for the study.

First, **organisations represented one of the following FDI industries:**

- Pharmaceuticals
- Medical Technology
- Engineering
- Technology
- International Financial Services
- Consumer and Business Services

Second, **organisations were identified as being among the most digitally advanced in the IDA Ireland client portfolio** and as leaders in their industry. The rationale was that leaders from these organisations would be best placed to shed light on the optimal data and digital skills needed now and into the future. In total, 50 organisations were invited to take part in the study. Insights were drawn from **31 organisations, 15 subject matter experts and desktop research.**

Online Qualtrics survey

A total of **108 industry leaders and managers representing different functions and FDI industries completed an anonymous, online survey.** In designing the survey it was important to balance the demand to get granular data with ensuring the survey was minimally onerous for industry leaders with competing demands. Representatives from IDA Ireland and Skillnet Ireland, together with subject matter experts possessing deep industry knowledge, contracted the long list of skills and tool types to those most relevant to non-IT roles across functions in industries, and consolidated the functions into groups.

Focus groups with industry leaders

In total, **13 online focus groups were held with 36 industry leaders representing different functions** (one per organisation). The purpose of the focus groups was to gather rich, qualitative data to supplement the survey data and to test some of the findings from the survey. A semi-structured interview script was used to inform the focus group discussion. See the Appendices for more detail on the data collection tools.

Workshops with subject matter experts

Subject matter experts were selected on the basis of having worked in or with FDI industries and having specific subject matter expertise relevant to the study. A total of 5 workshops with subject matter experts were conducted to test and triangulate the findings from the data collection process and to seek input into any changes in industry since the study began.

Survey respondents - Breakdown by industry and function

Figure 1 and 2 depict the survey respondent breakdown by industry and function, respectively.
Functions were grouped into categories to minimise the length of the survey. There was higher representation from: Operations , Finance / Procurement / Tax, Manufacturing, Quality (Assurance and Control) and Human Resources / People / Occupational Health and Safety.

Figure 1: Number of survey respondents by industry *(N=108)*

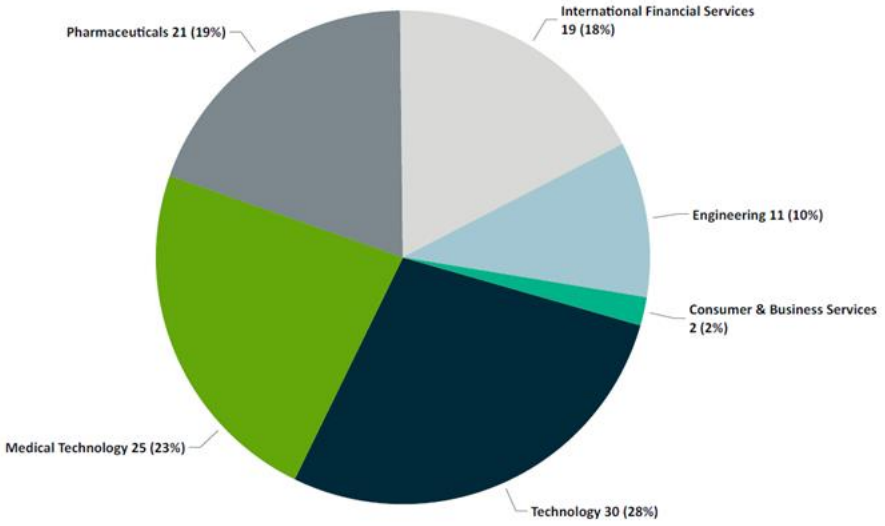
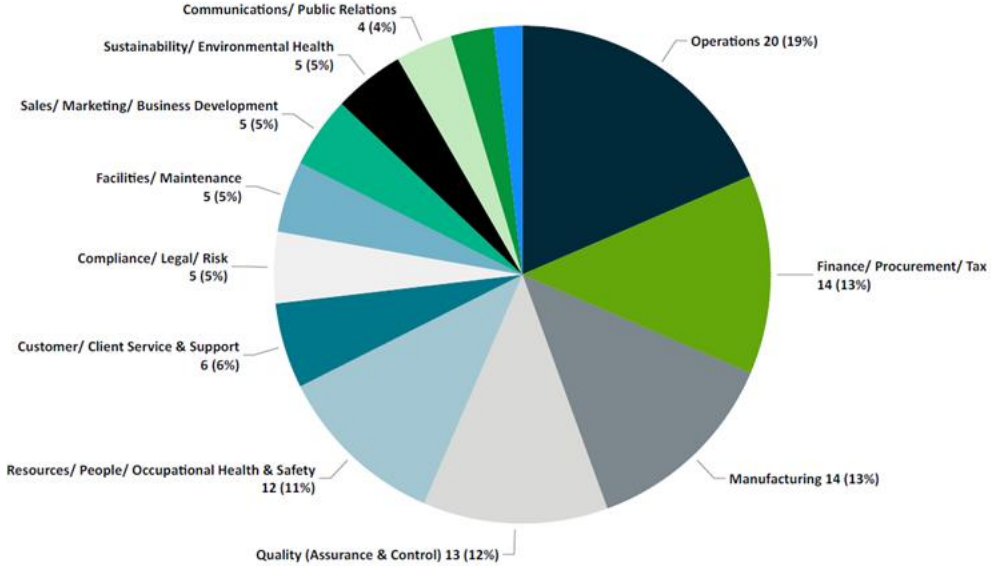


Figure 2: Number of survey respondents by function *(N=108)*



Focus groups - Breakdown by industry

Of the 28 organisations invited to be involved in focus groups, 13 agreed to take part. There was higher representation from Medical Technology, Pharmaceuticals and Technology. Although a larger sample size correlates with more reliable data and the findings from focus groups cannot be generalised, as discussed in Section 3, there was considerable overlap in the key themes and findings across industries and data collection methods.

Table 1: Number of focus group participants by industry

Industry	Individual organisations	Individual participants
Medical Technology	4	15
Pharmaceuticals	2	9
Technology	5	8
Engineering	1	2
International Financial Services	1	2

Focus group respondents represented functions such as:

- C-suite
- Business intelligence
- Finance
- Sales and marketing
- Quality (assurance and control)
- Manufacturing
- Human resources
- Sustainability
- Customer experience/support

Section 3: Study findings

Structure of the findings

This section outlines the main findings from the study, aligned to the research objectives. The findings are organised as follows:

- **Core digital and data skills required for non-IT roles:** Outlines the main data and digital skills for all non-IT roles identified across all data collection methods, followed by a breakdown of the skills identified by survey respondents and a snapshot of the transversal skills discussed in focus groups.
- **The extent to which graduates, school leavers and employees have these core skills:** Focuses on the findings in relation to whether school-leavers, graduates, and employees have the data and digital skills outlined by industry.
- **Whether current education and training meets the need to develop these core skills:** Focuses on education and training in relation to these core skills.
- **The role of leadership and culture in skills development:** This section explores the role of leadership and culture in skill development required for successful digital transformation.

"Technology is changing so fast even data scientists are struggling to keep up"
- Focus group participant

"Lots of organisations want to digitally transform: few have prepared for this"
- Focus group participant

What are the specific data and digital skills required in non-IT roles across Ireland's FDI industries? The skills that all workers, regardless of their role, will need over the next 3-5 years and beyond to work effectively with digital technology and data?

Data and digital skills for all non-IT roles

Survey respondents and focus groups participants identified basic, if not intermediate proficiency is required in the following skills:

- Data input
- Data analysis
- Data validation
- Data manipulation
- Data visualisation
- Digital communication and collaboration
- Presentation
- Digital problem-solving

49% of survey respondents identified data analysis as a skills gap for all employees at all levels. Focus group findings were consistent**. Industry leaders consulted overwhelmingly raised the importance of improving data literacy across the board.** This is consistent with research demonstrating that a whole-of-government approach to data skill development is required to equip the Irish workforce with the skills needed for the future of work (Darling et al 2022).

Another finding was that **data and digital skills are no longer the remit of technical or IT roles.** Rather, the workforce as a whole is going to need to be able to interpret, use and create meaning from data, and have the digital proficiency to work with technology and improve efficiency. In keeping with this, **over 1 in 10 survey respondents identified Automation and Robotics skills and Agile skills as gaps in their non-IT workforce.**

"We need to increase baseline comfort with looking at data… understanding where it is coming from and what it is telling us"

- Focus group participant

Developing key data and digital skills is a fundamental aspect of Ireland's education system

The foundation for the development of core digital and data skills is clearly articulated in the primary and secondary education curricula. As noted in the Senior Cycle Key Skills Framework; "The ability to think critically and creatively, innovate and adapt to change, to work independently and in a team, and to be a reflective learner are prerequisites for life and for the workplace in the 21st century" (National Council for Curriculum and Assessment, 2017).

Key skills	Primary Level Education	Secondary Level Education	Workplace
Data input, analysis, validation, manipulation and visualisation skills	Achieve comfort with numbers	Build basic numeracy alongside an appetite for managing large amounts of data	Input data, be able to manipulate it and ensure that it has been validated to remove errors. The ability to take a dataset and present it
Digital communication and collaboration skills	Foster a level of comfort with digital tools used to communicate and collaborate	Build on this familiarity with digital tools especially for the means of communicating and collaborating within a team	Use digital tools to communicate and collaborate with colleagues and clients/customers
Presentation skills	Be a confident communicator e.g., storytell the meaning behind a class project	Build on communication skills e.g., storytell the meaning behind a class project	Present and pitch ideas/materials to their colleagues and clients/customers
Digital problem solving skills	Be a critical thinker and digital learner	Build on problem solving and critical thinking skills	Use digital tools in their day to day processes including the automation of some tasks

Survey findings: Core skills by industry and function

This page provides a breakdown of survey respondents views of the core skills per a) across all industries and functions b) across industries and c) across functions.

Section a outlines **the most commonly selected data and digital skills identified by all survey respondents**.

***Data skills include: data input, analysis, validation, manipulation and visualisation**. Other key skills include: **virtual communication and collaboration, presentation and digital problem solving**.

Section b highlights the top three skills identified by survey respondents in different industries. Section c highlights the top two skills identified by survey respondents from different function groups.

Although there are differences between how industries and functions prioritised the skills, a key finding was that **all industries and functions will need to ensure their workforce has the core skills in section a.**

Section a) Core skills required across all industries and functions

Data skills*

Digital problem solving

Document design and presentation

Digital communication and collaboration

Section b) Core skills required across specific industries

Technology
Data governance
Fraud detection and protection
Agile management

Medical Technology
Data governance
Lean methodologies
Agile management

Engineering
Lean methodologies
Digital transformation
Design thinking

Pharmaceuticals
Lean methodologies
Digitisation
Data governance

International Financial Services
Data governance
Data security
Fraud detection and prevention

Compliance
Fraud detection and prevention
Data security

Facilities
Data input
Data manipulation

Sales and Marketing
Agile management
Fraud detection and prevention

Manufacturing
Document design
Digital problem solving

Quality
Data validation
Data manipulation

Customer / Client Service
Digital transformation
Digitisation

Section c) Core skills required across function groups

Finance / Procurement
Data governance
Data manipulation

Operations
Digital problem solving
Data validation

Quality
Data validation
Data manipulation

Customer / Client Service
Digital transformation
Digitisation

Manufacturing
Document design
Digital problem solving

HR
Data governance
Data validation

The findings above need to be treated with caution since the proportion of survey respondents per industry and function differed.

Survey findings: Skills definitions

The following table defines the most commonly required data and digital skills in non-IT roles across industries and functions.

Skill	Definition
Data input	Putting data into a database such as Excel
Data analysis	Inspecting, cleansing, transforming, and modeling data with the goal of discovering useful information, informing conclusions, and supporting decision-making
Data validation	Checking the integrity, accuracy and structure of data before it is used for a business operation
Data manipulation	Changing or altering data in order to make it more readable and organised
Data visualisation	The graphical representation of information and data
Data governance	Ensuring data is secure, private, accurate, available, and usable
Virtual communication and collaboration	Sharing information and communicating virtually
Presentation	Presenting information and data in clear and engaging formats
Digital problem solving	Combines data literacy, design thinking, and computational thinking
Document design	Choosing how to present all of the basic document elements so your document's message is clear and effective
Lean methodologies	Using a team-focused managerial approach that seeks to improve performance by eliminating resource waste and defects
Digital transformation	The adoption of digital technology to digitise non-digital products, services or operations
Digitisation	Converting information into a digital format
Data security	Protecting digital information from unauthorised access, corruption, or theft throughout its entire lifecycle
Design thinking	A non-linear, iterative process used to understand users, challenge assumptions, redefine problems and create innovative solutions to prototype and test
Fraud prevention and detection	Fraud prevention is about halting fraud before it happens, while fraud detection is about identifying fraud as it happens
Agile management	Applying the principles of agile software development and lean management to various management processes

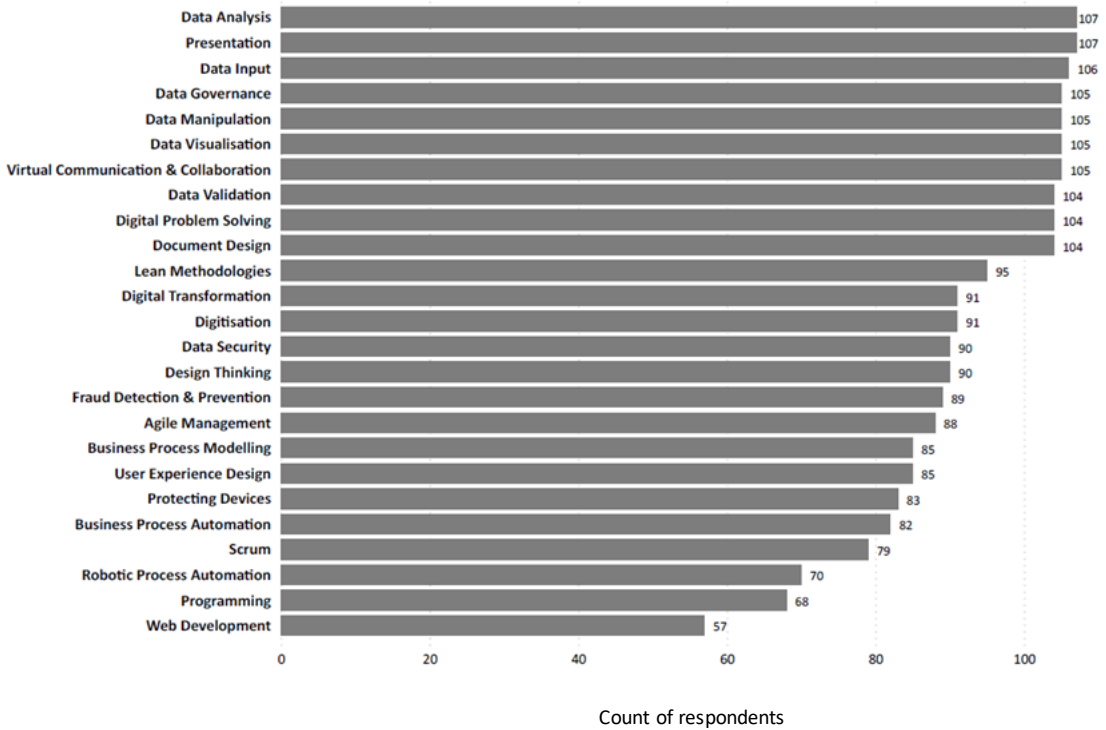
Survey findings: Number of respondents that cited each skill

Figure 3 represents the number of respondents that cited each data and digital skill as being required. That is, those who didn't select the 'N/A' option when asked to assess the level of competence required in each skill.

These findings are consistent with the the core skills required across all industries and functions outlined on the previous slide, which were all cited as being required by over 95% of respondents: data (input, analysis, validation, manipulation and visualisation), digital problem solving, document design and presentation, digital communication and collaboration.

Further detail into how each data and digital skill was rated by respondents in the six industries industry can be found in Appendix D.

Figure 3: Number of respondents that cited each skill *(N=108)*



Top 10 skills breakdown by seniority

Table 2 illustrates the **top 10 skills required per level of seniority, regardless of industry or function.** This data provides teams with insights into the required skills now and for the future for each role level, enabling them to tailor their talent development strategy accordingly.

Table 2: Top 10 skills per level of seniority *(N=108)*

	Entry/Junior	Senior/Professional	Lead/SME
1	Presentation	Presentation	Data analysis
2	Data input	Digital communication and collaboration	Presentation
3	Digital communication and collaboration	Data analysis	Digital communication and collaboration
4	Data analysis	Data manipulation	Data visualisation
5	Data validation	Data input	Data manipulation
6	Digital problem solving	Data validation	Data validation
7	Document design	Data governance	Data governance
8	Data manipulation	Data visualisation	Digital problem solving
9	Data governance	Digital problem solving	Data input
10	Data visualisation	Document design	Document design

Survey findings: Required level of competence for entry-level roles

The graph to the right depicts survey respondents' views on the level of competence required by entry/junior level roles in data and digital skills (irrespective of industry or function).

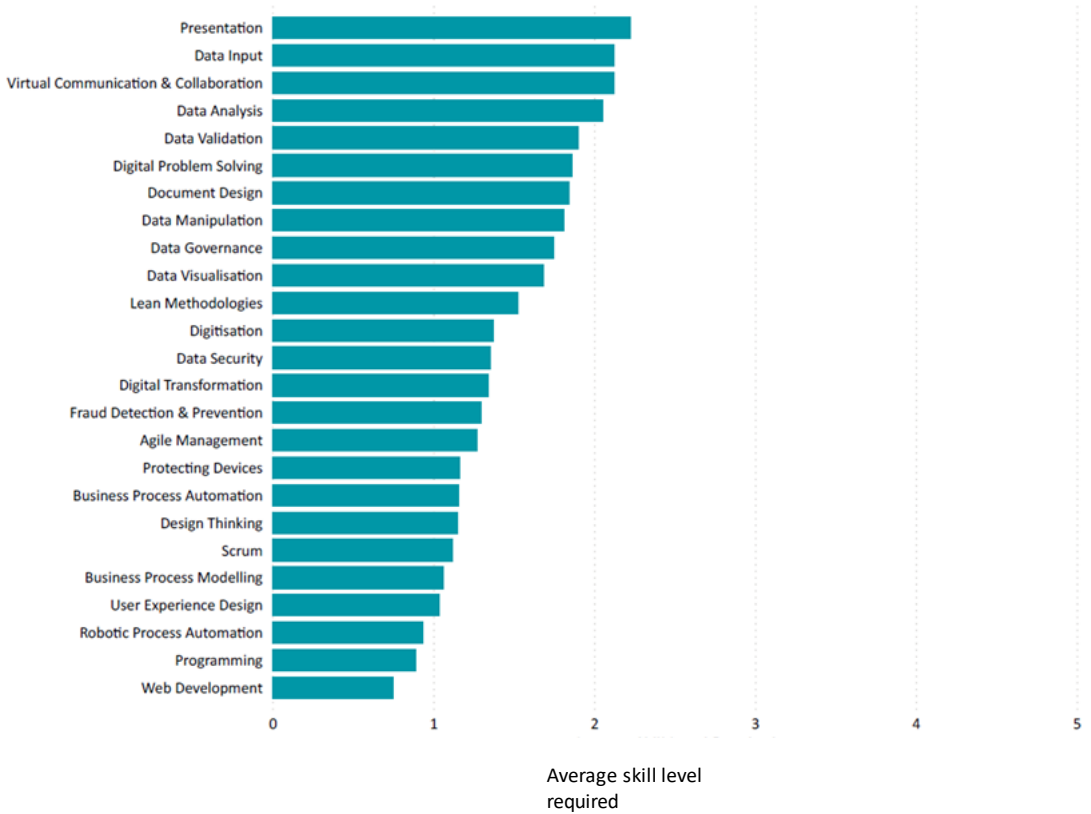
The average skill level of 1-2 on the x-axis translates to **entry/junior level roles requiring a beginner/novice understanding and needing guidance to complete tasks relating to that skill**.

Entry/junior level non-IT roles require a beginner/novice level of the following skills: data (input, analysis, validation, manipulation, governance and visualisation), presentation, virtual communication and collaboration, digital problem solving and document design.

These skills consistently ranked as a higher priority for survey respondents than more niche skills, regardless of seniority of role.

Of interest, **100% of the skills assessed indicated a positive correlation between level of proficiency required and level of seniority** (irrespective of function or industry). As discussed on page 37, this was in tension with findings from the focus group.

Figure 4: Required level of competence for entry-level roles *(N=108)*



Focus group findings: Additional skills for non-IT roles

An unexpected finding was that focus group respondents agreed that **hard skills** (objective, quantifiable skills gained through education and training) **should not be viewed in isolation from the transversal skills** (including soft skills which can be used in a wide variety of situations in life and in work) outlined below. Some participants went so far as to suggest that transversal skills were more important than hard skills as they can be harder to teach. Of interest, these transversal skills were also reflected in views on the culture needed to support workers to embrace digitisation.

Additional skills identified by focus group participants:

Hard Skills

- Interpreting and using data in real time
- Proficiency with cloud-based platforms
- Using data for story-telling and to inform decisions

Transversal Skills

- Resilience through change
- Appetite for lifelong learning
- Digital mindset i.e. embrace new technology and learn from mistakes

"A willingness to learn is something that we look for in graduates"
- Focus group participant

Skills and tool types identified in surveys and focus groups

The table below is informed by survey and focus group data. It outlines the relationship between skills and the types of tool s used by industry. It includes examples of tools cited by industry respondents. These are illustrative and in no order. Most of the skills and tool types identified are generic and industry-agnostic.

Skills group	Specific skills	Tool type	Examples of tools identified by survey respondents
Agile and lean	Agile management, Lean methodologies, Scrum	Project management tools	Jira, Kanban, Microsoft Project, Monday.com, Trello
Automation and robotics	Business process automation, Business process modelling, Robotic process automation	Automation tools	Nintex, Power Automate, SAP Fiori, UI Path, VB Apps
Data	Data analysis, Data governance, Data manipulation, Data validation, Data visualisation	Data analysis tools	Alteryx, Excel, Informa, Minitab, SAS
		Data visualisation tools	Diver, Looker, PowerBI, Qlik, Tableau
Digital design	Design thinking, User experience design	Computer-aided design (CAD) tools	Autocad, CREO, Siemens NX, Solidworks, Visio
General data and digital	Data input, Digital problem solving, Document design, Presentation, Virtual communication and Collaboration	Meeting/Email/Chat tools	Google Suite, Microsoft 365, Slack, WebEx, Zoom
		Database management tools	Azure Databricks, Cloudera, MySQL, Oracle, Spreadsheet Server,
Software development	Programming, Web development	Programming languages	C/C++, Javascript, Python, R, SQL
		Simulation tools	Deform, MatLab, Minitab, Sim Center Star CCM+, Simio
Transformation	Digital transformation, Digitisation	Enterprise resource planning (ERP) tools	Hubspot, Jira, Oracle's JD Edwards Enterpriseone, SAP, Salesforce
		Customer relationship management (CRM) tools and Human resource information systems (HRIS)	Hubspot, Salesforce, 6Sense, WebOps, Workday

Does industry consider school-leavers, graduates, and employees as having these fundamental data and digital skills?

Industry views on core skills in school-leavers and graduates

Below is an overview of focus group participants' views on school-leavers and graduates combined. Industry views on graduates are discussed in more detail on the following page.

Comfort with digital and the core skills and tools

- Focus group participants agreed that although new joiners are generally more digitally savvy, that rarely translates to being more skilled in the digital tools used in industry. There was agreement that applying skills such as using data as a basis for problem solving, collaborating virtually and being able to present using digitally enabled tools and techniques, was a gap.

Developing data literacy to problem-solve with data

- A common theme was that basic data skills may need more focus in schools and third-level institutions to equip individuals with the skills to problem solve and use data when they enter the workforce.

Increasing exposure to key features of the world of work

- Most participants felt there would be merit in expanding the pool of school-leavers and graduates familiar with the common tool types found in industry. There was agreement that new joiners who had done an apprenticeship, internship or placement programme were better equipped for the world of work because they had such experience.

"We need to expand the talent pool to include apprenticeships, internships and placement programmes"
- Survey respondent

Industry views on graduates

Below are some of the findings from focus group discussions and workshops with subject matter experts:

Prioritise problem-solving skills

- Although more digitally literate, many graduates struggle to know what data is telling them or how to use it to inform decisions. This is the case even if they can input and visualise data. Industry leaders agreed that critical thinking and problem-solving with data were a common skill gap.

The importance of degree type

- There was agreement that for non-IT roles, a graduate's degree type tended not to correlate with whether they could develop data and digital skills on the job with onboarding and training. One reason cited for this was that if a graduate is willing to learn new skills and embrace technology, they can develop the skills.

Maintaining data and digital skills

- Skilled graduates who have more proficiency in data and / or digital skills tend to deskill if the organisation is less digitally transformed and they cannot practice and apply their skills in their day-to-day role.

"There is a huge disconnect between having the data, and understanding, communicating and…telling senior stakeholders what actions need to be taken."

- Focus group participant

Industry views on core skills in existing employees

Focus group participants agreed that **whether an existing employee had the core skills depended on their role, the stage of their career, and interest in lifelong learning**. Below are some key findings:

Disparities in data and digital skills amongst employees

- A finding was that there are disparities in data and digital skills amongst existing employees, even in digitally transformed organisations. Some regarded their existing employees as more proficient in the core skills than new joiners, but this was the exception.

Paradoxical findings in relation to upskilling and reskilling

- There was agreement that it is important to ensure those who have been in the workforce for a long time or who work in a less digitised function or role had equal opportunity to develop the core skills.

- Despite this, almost all participants reported an employee-led and software-led approach to upskilling and reskilling their workforce i.e. an employee request and / or introduction of new software or technology was the impetus to train people.

Correlation between hard skills and transversal skills

- A finding was that employees committed to lifelong learning tended to embrace learning new skills and technologies. For example, one organisation reported supporting an employee nearing retirement to pursue studies in data analytics as they were interested to better understand it for their role.

"Some operators have been in the organisation for 20+ years. We don't want them left behind as we move forward with our digitisation strategy."
- Focus group participant

How applicable is the current data and digital training and education provision to the needs of industry and to building future capacity in these core skill areas?

Applicability of education and training

Almost all organisations represented in focus groups were global and had comprehensive in-house onboarding and training. This was designed to build core skills and support new joiners (experienced or otherwise) to "hit the ground running" in the workforce.

The importance of practical education and training

- There was consensus that equipping people with the skills they need to use data and digital technologies in their job was most valuable. Common examples raised included creating dashboards and explaining what data was saying.

Microcredentials

- In focus groups, industry leaders cited **competing demands and insufficient time to attend training as the main barriers to workforce development.** Participants agreed that accredited, minimally disruptive training and education was optimal for employees and employers. For this reason, microcredentials and **short, online courses** were highly regarded. Some respondents identified the need for **'stackable' microcredentials** that enabled employees to work towards further degree diploma-level courses over time.

Work experience opportunities

- Most focus group respondents valued new joiners who had done an apprenticeship, placement programme or internship. The main reason for this was that these gave school-leavers and graduates exposure to the world of work, which meant slightly less onboarding and in-house training in the basics was required.

Industry-specific education and training

- Certified and / or degree courses tailored to roles in industry were regarded as valuable by some focus group participants. Examples included the Masters in Analytics for a Medical Technology and courses offered through the Institute of Banking for the International Financial Services industry.

Building future skills and capacity

Focus group discussions touched on three main stakeholders involved in building future skills and capacity: employees, employers and education and training providers.

- **Current and prospectives employees**
  A finding was that those looking to enter or progress in non-IT roles need to develop core data and digital skills. For some, this may mean pursuing foundational training in data and digital skills, particularly if they work in an organisation that does not have the scale or resources to provide comprehensive training and onboarding.

- **Employers**
  Less than a third of the organisations reported having medium and long-term talent development strategies aligned to their digital strategies to equip employees with the skills their business would need for the future. A common theme was that there is an opportunity for all employers to take a more medium-term, strategic view of building skills and capacity in their workforce.

- **Education and training providers**
  An implication of focus group discussions was that to equip future employees with core data and digital skills, school age children need to be exposed to the kinds of tools and technologies relevant to the world of work. This is revisited in Section 4.

"If you have generic data skills, almost anything else can be taught. If you can write the code to query a database…the world is your oyster"
- Subject matter expert

Additional findings:
The role of leaders and organisational culture on data and digital skill development.

The role of leadership in skills development

A key finding was that all leaders in non-IT roles need to recognise that data and digital skills are no longer the domain of technical or IT roles. Rather, leaders are critical to **'transitioning to a skills-first approach'** (Skillnet Ireland 2023b).

Participants identified the following ways in which effective leaders help to drive digital transformation:

- Translate the benefits of data and digital skills and tools to the workplace and improving people's work
- Role model consistent messaging about digitisation and the organisation's digital strategy
- Role model experimenting with and adopting new tools and technologies
- Reduce fear around new technologies and tools by explaining and normalising them
- Create a culture of lifelong learning and leaning in to technology and digitisation
- Focus on the "metrics that matter" and drive a culture that values data-driven decisions

> ***"Change management… might be the number one digitisation skill that is needed across leadership"***
> - Focus group participant

Disparity in survey and focus group data

Although survey data indicated that leaders needed more proficiency in core data and digital skills than other employees, this finding was not reflected in focus groups.

Rather, focus group participants were unanimous that leaders needed to understand and role model comfort with technology. Leaders also need to translate the benefits of using digital and data in business to a diverse workforce. More specifically, leaders need **change management, communication and strategic skills to lead people and organisations through digital transformation**.

This requires hard and transversal skills to create an organisational culture that values data-driven decisions and embraces new technology to enhance customer satisfaction. Culture is discussed in more detail on the following page.

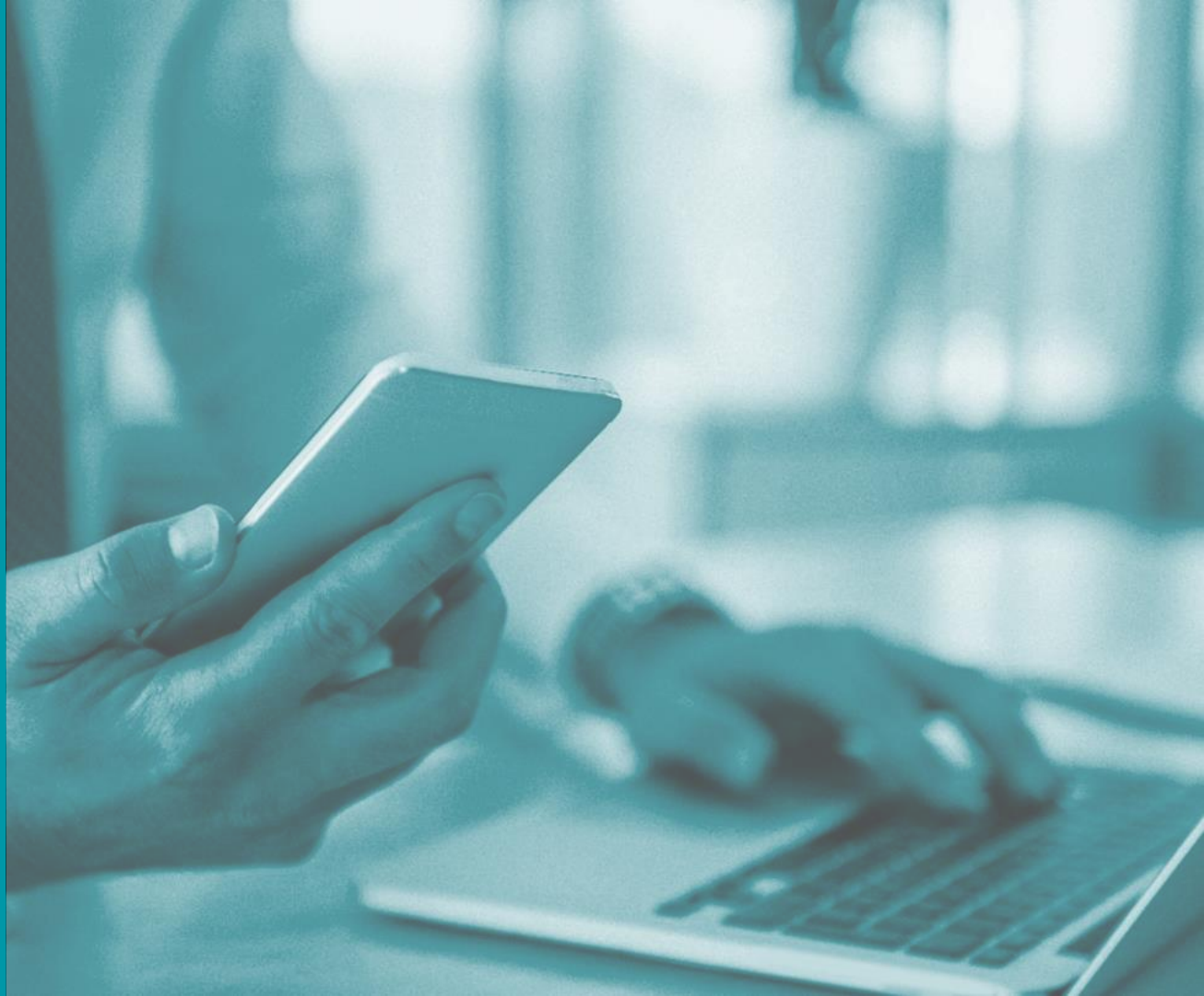
The role of culture in skills development

A common thread across focus group discussions was that **culture was seen as critical to skill development and digital transformation**. Below are some of the main findings:

- Creating a culture of **continuous learning and upskilling** empowers and encourages experienced employees and new joiners to develop core skills.
- **"Buy-in" is critical:** When people understand the reasons for digitisation and have an answer to the question of "what's in it for me?" they are more likely to want to develop data and digital skills.
- In organisations where leaders proactively address common reasons for resistance (such as fear of new technology), there was more employee engagement with data and digital skills and tools. Such organisations had leaders who drove **a culture that empowered people through change.**
- Organisations with a **data-driven culture** where employees take pride in how using data and digitising can improve outcomes for employees and employers alike, reported a more skilled workforce.

84% of executives say that having the right workforce and culture in place is highly important for the success of their digital transformations
(Forbes 2016)

Section 4: Discussion



The foundations for data and digital skills

An implication of the findings is that while the core data and digital skills are required in all non-IT roles regardless of industry or function, foundational skills need to be in place long before people leave school. Specifically, the **basic numeracy, statistics and digital skills are all necessary foundations for the core data and digital skills identified by industry.**

This is salient given recent findings (Government of Ireland 2021) that:

- 18% of adults struggle with reading
- 25% of adults have difficulties using maths in everyday life
- 47% of adults lack basic digital skills

All adults in the workforce will need support to ensure they have these foundational skills. **Basic data and digital literacy cannot be assumed, particularly if an individual has been in the workforce a long time or is in a function that is not yet digitalised.**

Another key finding is that it is not enough for **school-leavers and graduates** to be more comfortable with technology: they **need exposure to the kinds of digital communication, collaboration and presentation tools central to most work environments**.

"It starts earlier than university and school…kids need to start being exposed to technology and understanding data much sooner."

- Subject matter expert

Considerations for employers and leaders

Employers need to take a more strategic and proactive role in data and digital skills development as they are instrumental to bridging the data and digital skills gaps.

- An implication of the findings is that **employers ideally need to move beyond employee- and software-led training** towards medium-term strategic talent development planning.
- A key theme was that organisations need to **align their digitisation strategy to their talent development strategy**. This will help to ensure organisations are deliberate about building and maintaining a skilled non-IT workforce into the future.
- An important finding was that employers and leaders need to be more strategic about building a culture conducive to digitalisation. This aligns to findings in relation to the hallmarks of a digitally transformed organisation outlined on page 12.

"Employees can be forgiven for not having a clear view of their future skills requirements. Employers can't. Every leadership team should be able to draw a direct line from the capabilities they need to grow…to the specific business outcomes they want to achieve."
(PwC Hopes and Fears Survey 2023)

"The data people are processing every day is not manageable without a digitisation strategy"
- Focus group participant

Considerations for educators and trainers

The data suggests that there is pressure on employers to equip new hires (experienced or otherwise) with the core skills they need to comfortably use technology and tools in the work environment. This has implications for the education and training system:

- **Supporting school-leavers**
  There is an opportunity to support school leavers with more exposure to the kinds of digital tools used in industry (see page 28) and with the foundational skills to support data and digital literacy such as basic numeracy, statistics, critical thinking and problem solving.

- **Supporting graduates**
  There is an opportunity to put measures in place to support all non-IT graduates to develop at least beginner or novice proficiency in the skills identified here. This will ideally mean future graduates are not disadvantaged by securing a job in an organisation that does not have the resources or scale to provide comprehensive data and digital upskilling and onboarding.

- **Supporting employees in the workforce**
  An implication of this study is that educators and trainers focused on workforce skills development (whether in industry or adjacent to it) need to bolster their efforts to support all adults to develop basic proficiency in the core data and digital skills.

In order to equip our workforce with the skills needed for the future of work, a whole-of-government approach to data and digital skill development is required
(Darling et al 2022)

Section 5: Conclusion and recommendations

Conclusions

This study is unique in Ireland, not only because of its granularity and focus on non-IT roles but because the findings are informed by leaders across multiple FDI industries from global, digitally transformed organisations as well as subject matter experts with deep industry knowledge.

The findings provide novel insights into how different industry leaders are approaching data and digital skill development in their workforce. They also reflect some of the hallmarks of digitally transformed organisations that would be valuable to employers and leaders looking to implement sustainable digital transformation.

The aims of this study were to gather industry leaders' views on the following:

- The specific data and digital skills required for all non-IT roles now and in the future
- Whether school-leavers, graduates and employees have these fundamental skills
- The applicability of current education and training to the needs of industry and building future capacity in these skill areas.

Key points

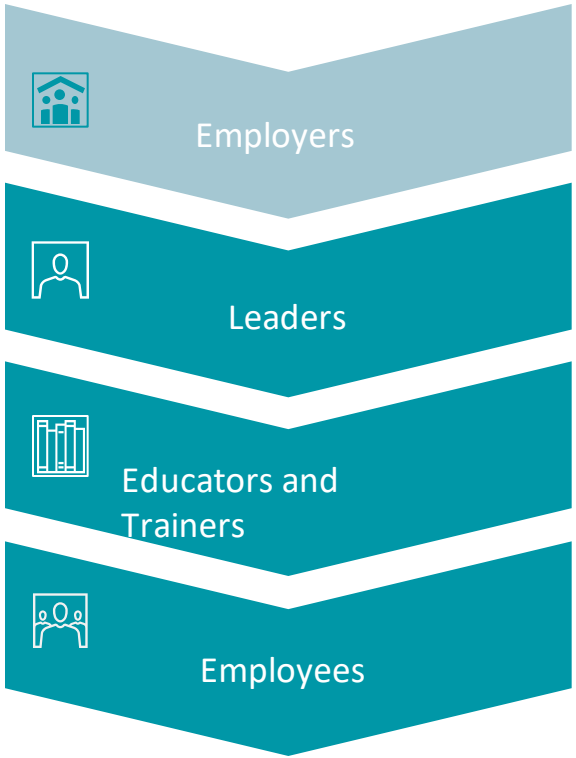
As the world of work and technology continues to evolve, everyone within the scope of this study - regardless of role and industry - will need data skills and the ability to work confidently with digital technologies. The study identified the following skills are core for all non-IT roles:

- Data skills (input, analysis, validation, manipulation and visualisation)
- Digital problem solving
- Document design and presentation
- Digital communication and collaboration

Building and maintaining these skills relies on transversal skills such as a commitment to lifelong learning, resilience to change, and having a digital mindset.

However, the foundational skills to develop these core skills need to be in place before an individual leaves school. This has implications for education and training providers, and for employers as both play a role in supporting people to develop them.

Recommendation areas



Employers
Whether it is through providing comprehensive onboarding and upskilling, or through supporting employees to undertake education and training, **employers are critical to data and digital skill development.**

Employers should consider data and digital skills as a mandatory part of their talent development strategy to ensure their workforce has at least basic proficiency in these areas. To do this in targeted way that does not leave anyone behind, it is worth conducting a regular **skills assessment of all non-IT roles and functions**. This will give employers a baseline understanding of the gap between current skills and the data and digital skills needed for the future.

An unexpected finding was that - even amongst digitally transformed organisations - upskilling tends to be employee and software-led. **There would be merit in employers adopting a longer-term view of talent development that aligns to their business goals and outcomes.** With that in place, employers could be more proactive about "shaping their future" (Leinwald et al 2022).

An **organisation-wide mandate for data literacy** can be more effective than discrete training for particular functions (Forbes 2022). This can be achieved in novel ways such as **building internal "data communities"** i.e. networks of data literate employees to assist in supporting peers. Similar initiatives have been used in digital transformation journeys in global professional services firms. For example, using a **network of non-IT "digital accelerators"** to train employees to develop skills in technology and digital problem-solving, and **digital experts** who can work with employees to support them to troubleshoot and leverage data and digital to achieve more complex tasks.

Recommendation areas

Leaders

An implication of the study is that **leaders cannot afford to be complacent about data and digital skill development amongst their non-IT workforce**. All leaders play a critical role in building a workforce skilled in the core data and digital skills here. Given the rate of technological advancements and digitisation, it is important for leaders to be strategic and proactive about the skills their organisation and people will need in the next 3-5 years and beyond.

Leaders are critical to creating a culture conducive to successful digital transformation. Evidence suggests that **over 70% of digital transformation initiatives fall short of their goals** (Forbes 2021) due to factors such as resistance to change, fear of technology, and poor communication and change management.

As such, it would be beneficial for leaders to ensure they have skills such as change management and communication, alongside sufficient data and digital proficiency to role model comfort with digital tools and technology. Leaders should consider how best to communicate and reinforce key messages about the benefits of data-driven decisions and digitisation. Such **cognitive and relational skills** are fundamental for all leaders (Skillnet Ireland 2023a).

Since **all leaders will need to use data and digital skills to make strategic business decisions and communicate the benefits of digital transformation**, some individuals may need to prioritise data and digital upskilling to support them to achieve this.

Recommendation areas

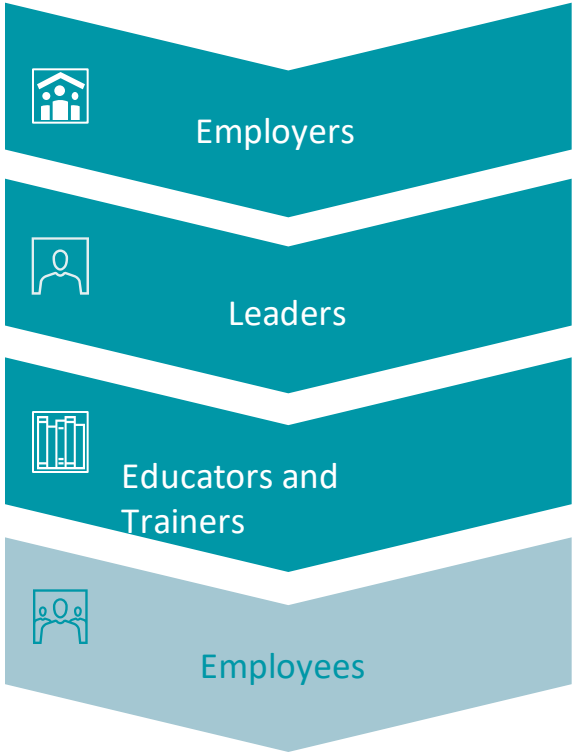
Educators and Trainers
Despite investment in bridging the digital divide through skills initiatives, recent findings suggest a need to redouble efforts (OECD 2023). Educators and trainers at all levels are encouraged to ensure the national talent development agenda is prioritised in its own right by reinforcing efforts to equip individuals with the data and digital skills outlined in this study.

School level educators:
An implication of this study is that individuals need basic numeracy, data literacy, and digital literacy to equip them to develop the core skills identified. There may be merit in exploring ways for the early learning curricula to support such skills. There may also be merit in **ensuring school-leavers have experience in the kinds of digital communication, collaboration and presentation tools used in industry.**

Third-level education:
Data from this study suggests that there is room to **better support non-IT graduates to problem-solve with data and develop more proficiency with the kinds of digital tools used in industry**. For example, if all non-IT graduates could create dashboards or digital presentations and explain what the data was telling them, it may help close some of the skills gaps discussed in focus groups. In keeping with this, a recent study revealed that graduates need additional support with technologies (Skillnet Ireland 2021).

Training and upskilling for employees:
Industry leaders consulted in this study valued **microcredentials and short, online courses** that minimise disruption to business-as-usual. **Small and medium enterprises** that might not have the scale or resources to offer comprehensive onboarding and in-house training, would benefit from initiatives provided by Skillnet Ireland, Springboard+, SOLAS, and Higher Education providers (Department of Enterprise, Trade and Employment 2021).

Recommendation areas



Employees

All employees **need to prioritise increasing their proficiency in the following skills:** data (input, analysis, validation, manipulation and visualisation), digital problem solving, document design and presentation, digital communication and collaboration, **alongside their ability to work confidently with digital technologies**.

Depending on the stage of an employee's career and nature of their role - they may not have the same opportunity or impetus to pursue upskilling. Against the backdrop of research demonstrating that adults in Ireland are less likely to pursue education and training (Clarke et al 2023; Government of Ireland 2021), there is a risk that existing employees will get left behind.

Current and future employees would benefit from looking for opportunities to develop the skills identified here. The need for support with further education and training may be more acute for those in roles that have yet to be digitised and / or in small and medium size enterprises that may not provide the in-house onboarding and training identified by many of the focus group respondents.

An implication of this study is that employees are encouraged to:

- **Experiment with technology** and regard mistakes as opportunities to learn
- Realise the importance of lifelong learning and **seek to upskill on a regular basis**
- **Avoid the temptation to assume that past education and / or extensive work experience will equip you for the future of work**

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Appendices

Appendix A: Data collection tools - Qualtrics survey

S1Q1 Section 1: The industry and function you represent

Which industry sector does your organisation sit within?
o Technology (1)
o Content Industry and Consumer and Business Services (2)
o Pharmaceuticals (3)
o Medical Technology (4)
o Engineering and Green Economy (5)
o International Financial Services (6)

S1Q2 Which function do you represent?
o Finance / Procurement / Tax (1)
o Human Resources / People / Occupational Health and Safety (OH&S) (2)
o Compliance / Legal / Risk / Internal Audit (3)
o Quality (Assurance and Control) (4)
o Regulatory Affairs (5)
o Customer / Client Service and Support (6)
o Supply Chain and Distribution (7)
o Facilities / Maintenance (8)
o Logistics / Warehouse (9)
o Manufacturing (10)
o Sales / Marketing / Business Development (BD) / Communications (11)
o Research and Development (RandD) (12)
o Operations (13)
o Communications / Public Relations (PR) (14)
o Sustainability / Environmental Health and Safety (15)

S2Q1 Section 2: The data and digital tools and technologies used in your function

Enterprise Resource Planning (ERP) systems
Used to manage day-to-day business activities such as accounting, procurement, project management, risk management and compliance, and supply chain operations. e.g. SAP S4/HANA, Microsoft Dynamics, NetSuite, Oracle, Odoo.

o Please list any ERP systems currently in use in your function. (1)
_____
o Please list any ERP systems planned for future use in your function. (2)
_____

S2Q2 Meeting / Email / Chat software
Used for hybrid communication e.g. Microsoft Teams, WebEx, Zoom, Google Meet. If not applicable, type in n/a.

o Please list any Meeting / Email / Chat Software currently in use in your function. (1)
_____
o Please list any Meeting / Email / Chat Software planned for future use in your function. (2) _____

S2Q3 Data analysis tools
Runs mathematical processes on large sets of data for statistical, qualitative, or predictive analysis. e.g. Alteryx, IBM SPSS, jmp, Seeq. If not applicable, type in n/a.

o Please list any data analysis tools currently in use in your function. (1)
_____
o Please list any data analysis tools planned for future use in your function. (2)
_____

Appendix A: Data collection tools - Qualtrics survey

S2Q4 Data visualisation tools
Tools used for reporting, visualising and analysing vast volumes of data e.g. PowerBI, Tableau. If not applicable, type in n/a.

o Please list any data visualisation tools currently in use in your function. (1)
_____
o Please list any data visualisation tools planned for future use in your function. (2)
_____

S2Q5 Project management software
Used to plan, organise, and allocate resources for managing projects. It helps teams collaborate and keep track of the project's progress while clearly defining tasks and responsibilities e.g. Kanban Chi, Zoho Projects, Basecamp, Trello.

o Please list any project management software currently in use in your function. (1)
_____
o Please list any project management software planned for future use in your function. (2) _____

S2Q6 Sales and marketing tools
Used to promote and sell your products or services. e.g. Adobe, Photoshop, Google Analytics, Youtube Content Version.
o Please list any Sales and marketing tools currently in use in your function. (1)
_____
o Please list any Sales and marketing tools planned for future use in your function. (2)
_____

S2Q7 Customer Relationship Management (CRM) systems
Systems used to build and track relationships with customers e.g. Salesforce, Hubspot, Zoho CRM. If not applicable, type in n/a.

o Please list any CRM systems currently in use in your function. (1)
_____
o Please list any CRM systems planned for future use in your function. (2)
_____

S2Q8 Human Resource Information Systems/ Human Resource Management Systems (HRIS/HRMS)
Combines a number of systems and processes to ensure the easy management of human resources, business processes and data e.g. Workday, SAP Success Factors, iCIMS Talent Acquisition, ADP.

o Please list any HRIS/HRMS software currently in use in your function. (1)
_____
o Please list any HRIS/HRMS software planned for future use in your function. (2)
_____

S2Q9 Resource management software
Used to allocate, assign, and track employees, finances, and equipment across projects. e.g.monday.com, forecast, mavenlink.

o Please list any Resource management software currently in use in your function. (1)
_____
o Please list any Resource management software planned for future use in your function. (2) _____

Appendix A: Data collection tools - Qualtrics survey

S2Q10 Customer service software
Helps organisations provide assistance and/or advice to the people who buy or use their products. e.g Zendesk.

o Please list any customer service software currently in use in your function. (1)
_____
o Please list any customer service software planned for future use in your function. (2)
_____

S2Q11 Automation tools
Software designed to turn repeatable, routine tasks into automated actions. e.g. Power Automate, Apps Script, UI Path.

o Please list any automation tools currently in use in your function. (1)
_____
o Please list any automation tools planned for future use in your function. (2)
_____

S2Q12 Simulation software
Based on the process of modeling a real phenomenon with a set of mathematical formulas. It allows the user to observe an operation through simulation without actually performing that operation. e.g. MATLAB, Simulink.

o Please list any simulation software currently in use in your function. (1)
_____
o Please list any simulation software planned for future use in your function. (2)
_____

S2Q13 Programming languages
Code for programming specific actions in a computer, application or software program, instructing them on how to perform e.g. Python, SQL.

o Please list any programming languages currently in use in your function. (1)
_____
o Please list any programming languages planned for future use in your function. (2)
_____

S2Q14 Database management systems
Used to create and manage a database, organising crucial information by storing, modifying, extracting and searching for information e.g. MySQL, Microsoft SQL Server, MongoDB, PostgreSQL.

o Please list any database management systems currently in use in your function. (1)
_____
o Please list any database management systems planned for future use in your function. (2) _____

S2Q15 Accounting software
Manages and records the day-to-day financial transactions of an organisation, including fixed asset management, expense management, revenue management, accounts receivable, accounts payable, subledger accounting, and reporting and analytics. e.g. Xero, Freshbooks.

o Please list any accounting software currently in use in your function. (1)
_____
o Please list any accounting software planned for future use in your function. (2)
_____

Appendix A: Data collection tools - Qualtrics survey

S2Q16 Computer-Aided Design (CAD) software
Used to digitally create 2D drawings and 3D models of real-world products before they're manufactured. e.g. AutoCAD.

o Please list any CAD software currently in use in your function. (1)
_____
o Please list any CAD software planned for future use in your function. (2)
_____

S2Q17 3D printing tools enable the construction of three dimensional objects

o Please list any 3D printing tools currently in use in your function. (1)
_____
o Please list any 3D printing tools planned for future use (2)
_____

S2Q18 Augmented Reality (AR) applications
Superimposes a computer-generated image on a user's view of the real world, providing a composite view.

o Please list any AR applications currently in use in your function. (1)
_____
o Please list any AR applications planned for future use in your function. (2)
_____

S2Q19 Artificial Intelligence (AI) tools technology that mimics human intelligence to perform tasks and can iteratively improve themselves. e.g. Chatbots.

o Please list any AI tools currently in use in your function. (1)
_____
o Please list any AI tools planned for future use in your function. (2)
_____

S3 Section 3: ***Non-IT data and digital skills needed in the next 3-5 years***

This section asks you to assess three role types: entry/junior level; senior/professional level; and lead/industry specialist (SME) level.
The following competency groups are mapped to the National Framework of Qualifications (NFQ):
Beginner: limited understanding - can achieve a very limited range of simple tasks with detailed guidance.
Novice: some understanding - can achieve a limited range of simple tasks with moderate guidance.
Intermediate: good understanding - can achieve a moderate range of reasonably complex tasks with minor guidance.
Advanced: very good understanding - can achieve a wide range of complex tasks with minor guidance by exception.
Expert: excellent understanding - can achieve a very wide range of very complex tasks with no guidance.

(Following page)

S4Q1 Section 4: The main skills and training gaps in your function
This final section focuses on whether there are any specific skills gaps and training needs in your function. The skills groups include: data analysis, general data, agile, design, transformation, cybersecurity, software development, automation and robotics.

o What, if any, skills gaps have you identified? (1)
_____
o What, if any, training and education needs have you identified? (2)
_____
o Any other comments? (e.g. on the availability of relevant training and/or the quality of graduates entering the workforce.) (3)
_____

Appendix A: Data collection tools - Qualtrics survey

S3Q1, S3Q2 and S3Q3: For a) Entry/Junior level roles b) Senior Professional level roles and c) Lead/industry specialist roles in your function, please select the minimum required level of competence in each of skills below.

	N/A (1)	Beginner (2)	Novice (3)	Intermediate (4)	Advanced (5)	Expert (6)
Data Analysis (1)	○	○	○	○	○	○
Data Visualisation (2)	○	○	○	○	○	○
Data Validation (3)	○	○	○	○	○	○
Data Manipulation (4)	○	○	○	○	○	○
Data Governance (5)	○	○	○	○	○	○
Document Design (21)	○	○	○	○	○	○
Data Input (22)	○	○	○	○	○	○
Presentation (23)	○	○	○	○	○	○
Digital Problem Solving (24)	○	○	○	○	○	○
Virtual Communication & Collaboration (25)	○	○	○	○	○	○
Agile Management (13)	○	○	○	○	○	○
Scrum (14)	○	○	○	○	○	○
Lean Methodologies (15)	○	○	○	○	○	○

	N/A (1)	Beginner (2)	Novice (3)	Intermediate (4)	Advanced (5)	Expert (6)
Design Thinking (9)	○	○	○	○	○	○
User Experience Design (10)	○	○	○	○	○	○
Digital Transformation (11)	○	○	○	○	○	○
Digitisation (12)	○	○	○	○	○	○
Programming (19)	○	○	○	○	○	○
Web Development (20)	○	○	○	○	○	○
Protecting Devices (16)	○	○	○	○	○	○
Data Security (17)	○	○	○	○	○	○
Fraud Detection & Prevention (18)	○	○	○	○	○	○
Robotic Process Automation (6)	○	○	○	○	○	○
Business Process Automation (7)	○	○	○	○	○	○
Business Process Modelling (8)	○	○	○	○	○	○

Appendix B: Semi-structured interview script for focus groups

The following semi-structured interview script was devised to ensure consistency across focus groups when exploring specific research areas. These discussions were aided by a facilitation tool, XLeap.

Section 1: Context setting and intro questions

- Introduction, agenda and overview
- Definition of what is meant by data and digital
- Has your organisation undergone a digital transformation journey? When did this begin?
- Who is responsible for driving digitalisation in your organisation?

Section 2: Digital transformation

1. Does your organisation have a digital strategy?
2. Does your organisation have a data and digitall skills strategy?
3. What role will digital play in delivering your organisation's strategy in the next 3-5 years?

Section 3: Data and digital skills: leadership skills

1. What are the main data and digital skills required for leadership positions in your organisation?
2. Where are the biggest data and digital skill gaps among leaders in your organisation?

Section 4: Data and digital skills: organisation-wide

6. What are the main data and digital skills all non-IT employees will need in the next 3-5 years in your organisation?
7. What are the main data and digital skills gaps among non-IT employees in your organisation?

Section 5: Data and digital skills: entry-level employees

6. Graduates entering the workforce meet the data and digital skills requirements of my organisation for non-IT roles: [Strongly Agree / Agree Somewhat / Neutral/ Disagree Somewhat / Strongly Disagree]
7. Graduates entering the workforce generally have more advanced data and digital skills than those who have been in the workforce longer: [Strongly Agree / Agree Somewhat / Neutral/ Disagree Somewhat / Strongly Disagree]
8. What are the main data and digital skills gaps among entry-level recruits for non-IT roles in your organisation?
9. Do the type and level of data and digital skills of entry-level recruits depend on qualifications/educational background? If so, what qualifications/backgrounds are equipping recruits better/worse than others?

Appendix B: Semi-structured interview script for focus groups

Section 6: Data and digital tools, technologies and platforms

12. What data and digital tools currently play a key role in your organisation's digitisation?
13. What digital and data tools do you expect to play a bigger role in your organisation's digitisation over the next 3-5 years?
14. What data and digital tools do you currently use that you do NOT expect to use in 3-5 years time?

Section 7: Education and training needs

12. What are the priority education and training needs for your organisation in relation to data and digital capabilities?
13. Current data education and training offerings in the market address skills gaps in my workforce relating to digital capabilities: [Strongly Agree / Agree Somewhat / Neutral/ Disagree Somewhat / Strongly Disagree]
14. Current digital education and training offerings in the market address skills gaps in my workforce in relation to data capabilities: [Strongly Agree / Agree Somewhat / Neutral/ Disagree Somewhat / Strongly Disagree

Section 8: Wrap up

18. Please rank the below barriers to workforce development in order of how much of an obstacle they represent in your organisation:

-Training and education opportunities
-Organisational Design
-Change Management
-Employee Engagement
-Time to attend training
-Other

Appendix C: Data collection tools - Aligning survey to NFQ

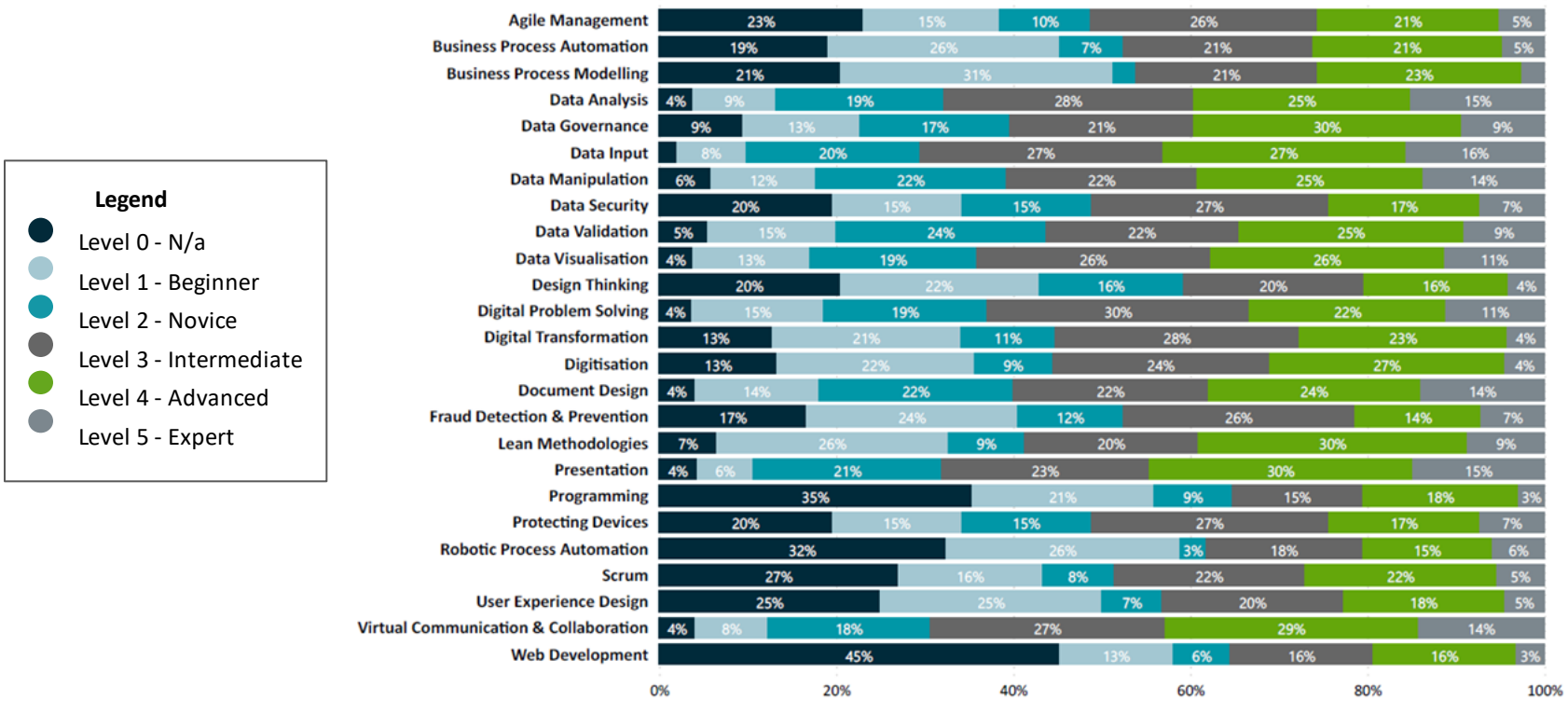
In order to ensure that survey data collected regarding the level of competence required in a particular data / digital skill was relevant to the education and training system, the levels of experience were loosely aligned to the National Framework of Qualifications (NFQ). The priority was to ensure survey respondents could equate how much support was required to a level 0-5.

This table should be used to understand the findings on the following pages which illustrate the percentage of survey respondents in each industry that assigned each data and digital skill as requiring a particular level of competence.

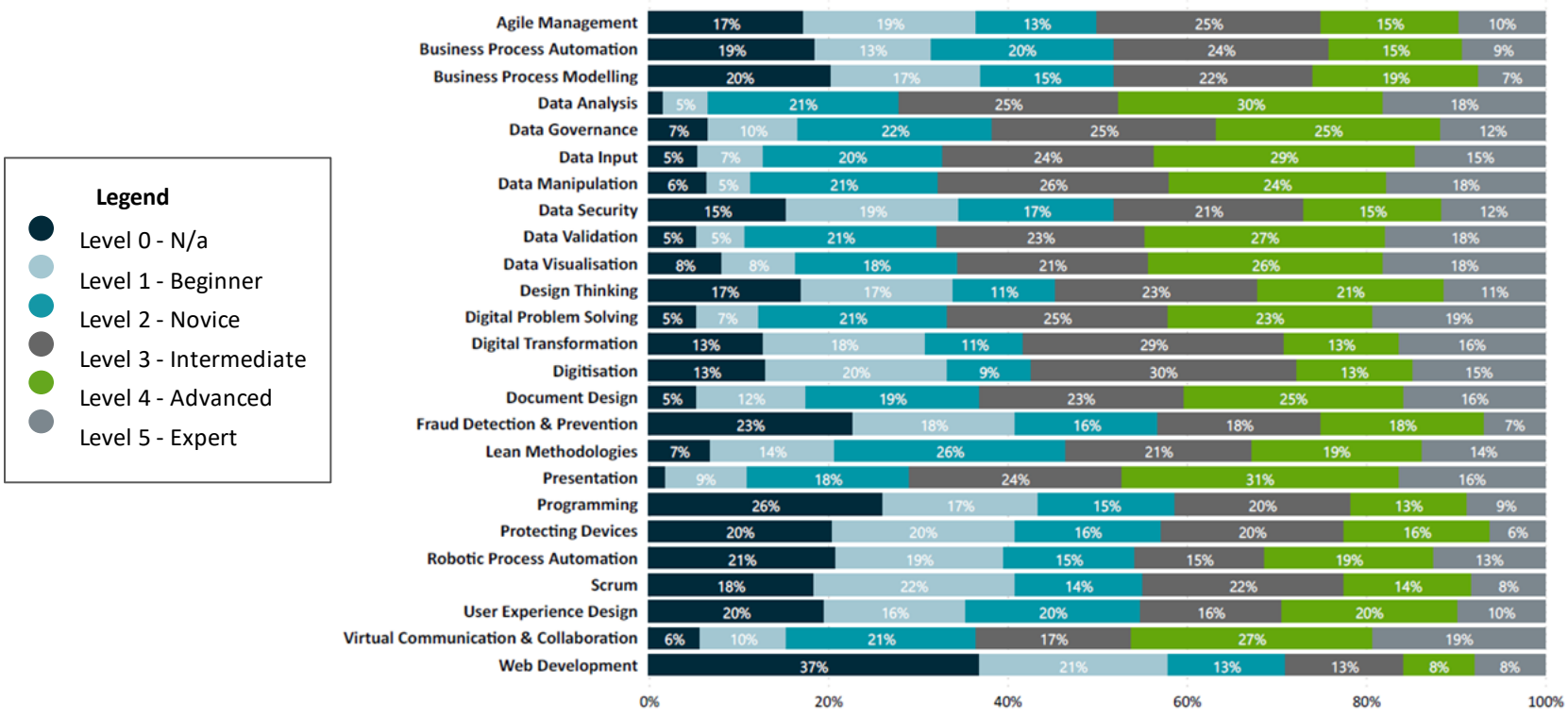
See here for a copy of the NFQ.

	N/A (0)	Beginner (1)	Novice (2)	Intermediate (3)	Advanced (4)	Expert (5)
NFQ Equivalent	0	1-2	3-4	5-6	7-8	9-10
Conceptual understanding	Very limited	Limited	Some understanding	Good understanding	Very good understanding	Excellent understanding
Direction needed	N/A	Detailed guidance needed to complete tasks.	Moderate guidance needed. Tasks need to be assigned to the individual but can be completed with some independence.	Minor guidance needed. Individual knows what tasks need to be achieved and can complete them independently.	Minimal guidance needed. The individual knows what tasks need to be achieved, can complete them independently and support others to do the same.	No guidance needed. The individual can achieve a breadth of complex tasks and can support senior stakeholders to solve abstract problems.
Task range	N/A	Very limited	Limited	Moderate	Wide	Very wide
Task complexity	N/A	Very simple	Simple	Reasonably complex	Complex	Very complex

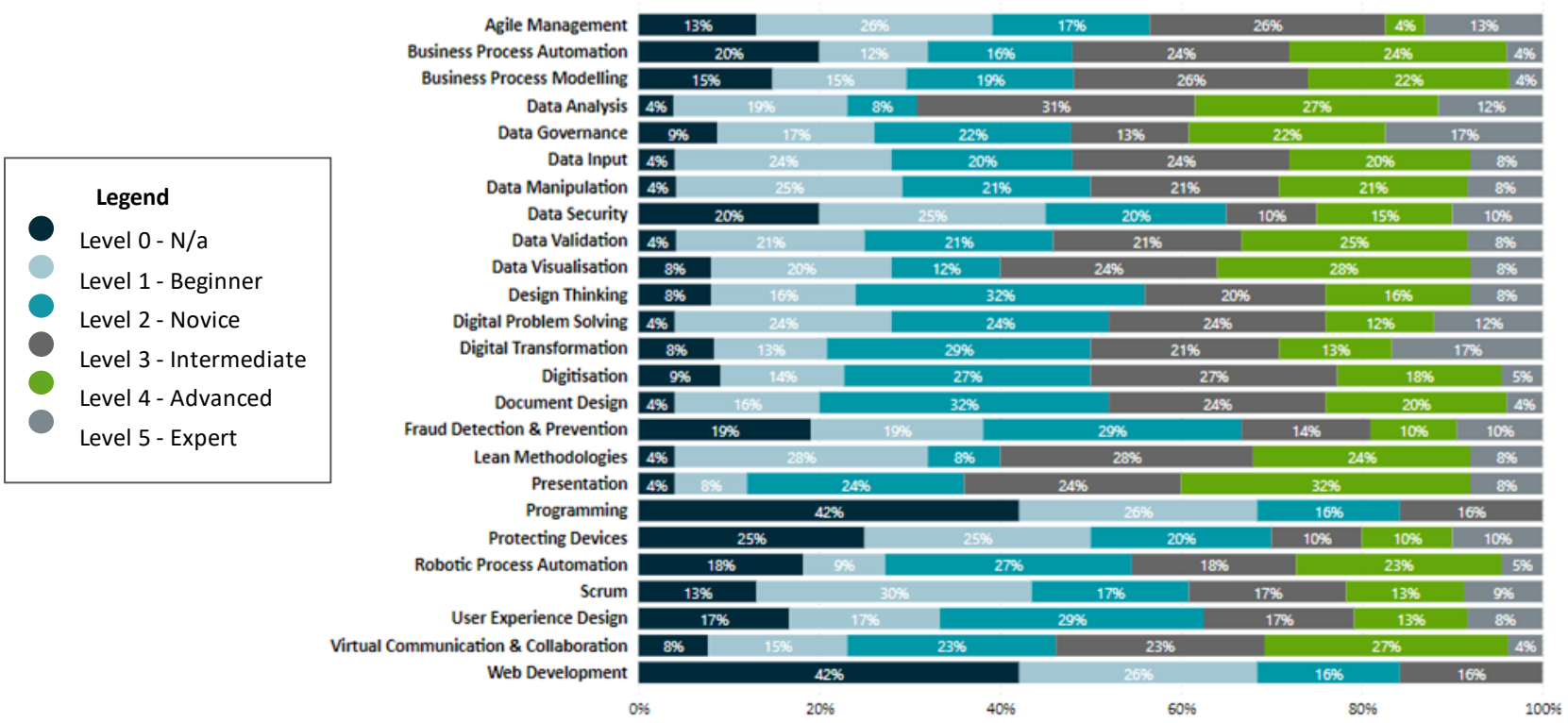
Appendix D: Breakdown of rating assigned to each skill - Pharmaceuticals



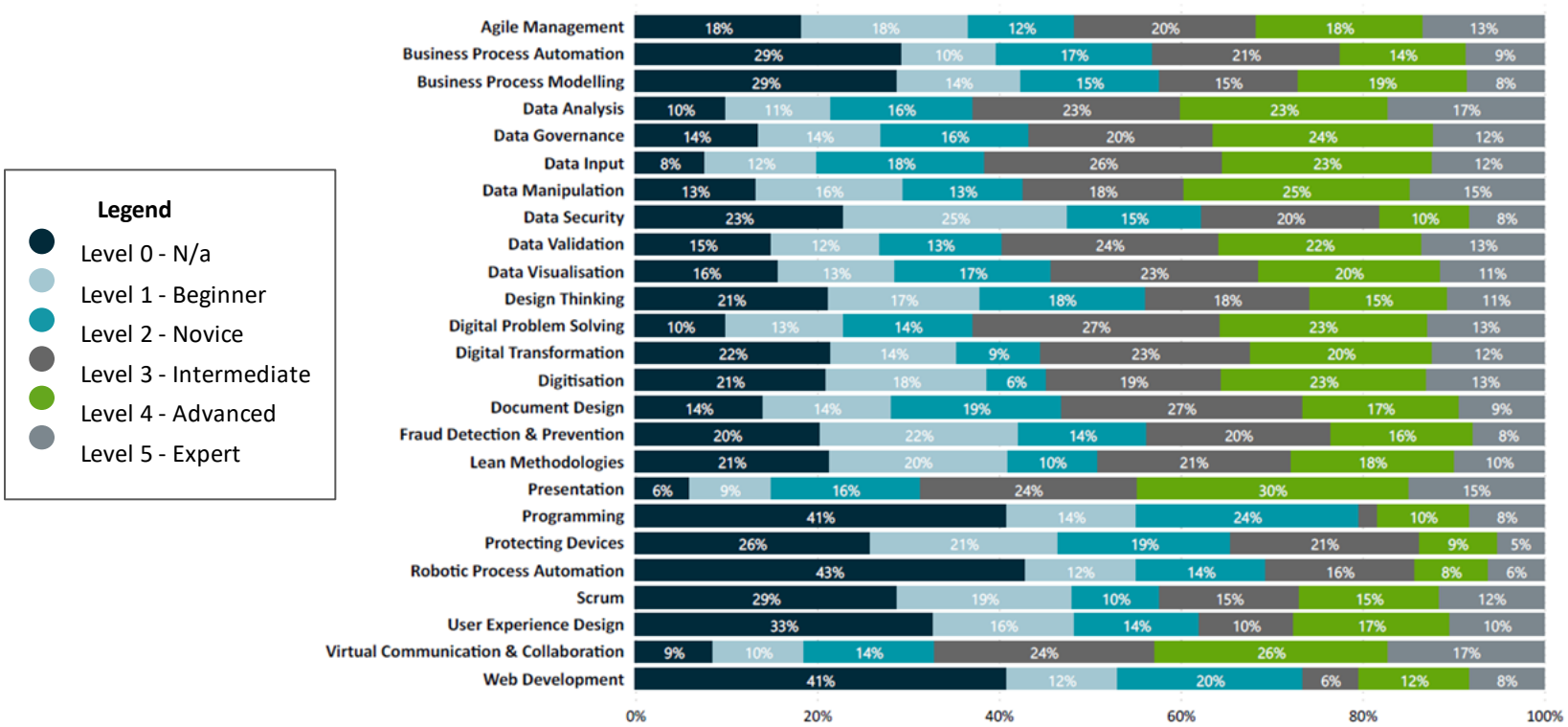
Appendix D: Breakdown of rating assigned to each skill - Medical Technology



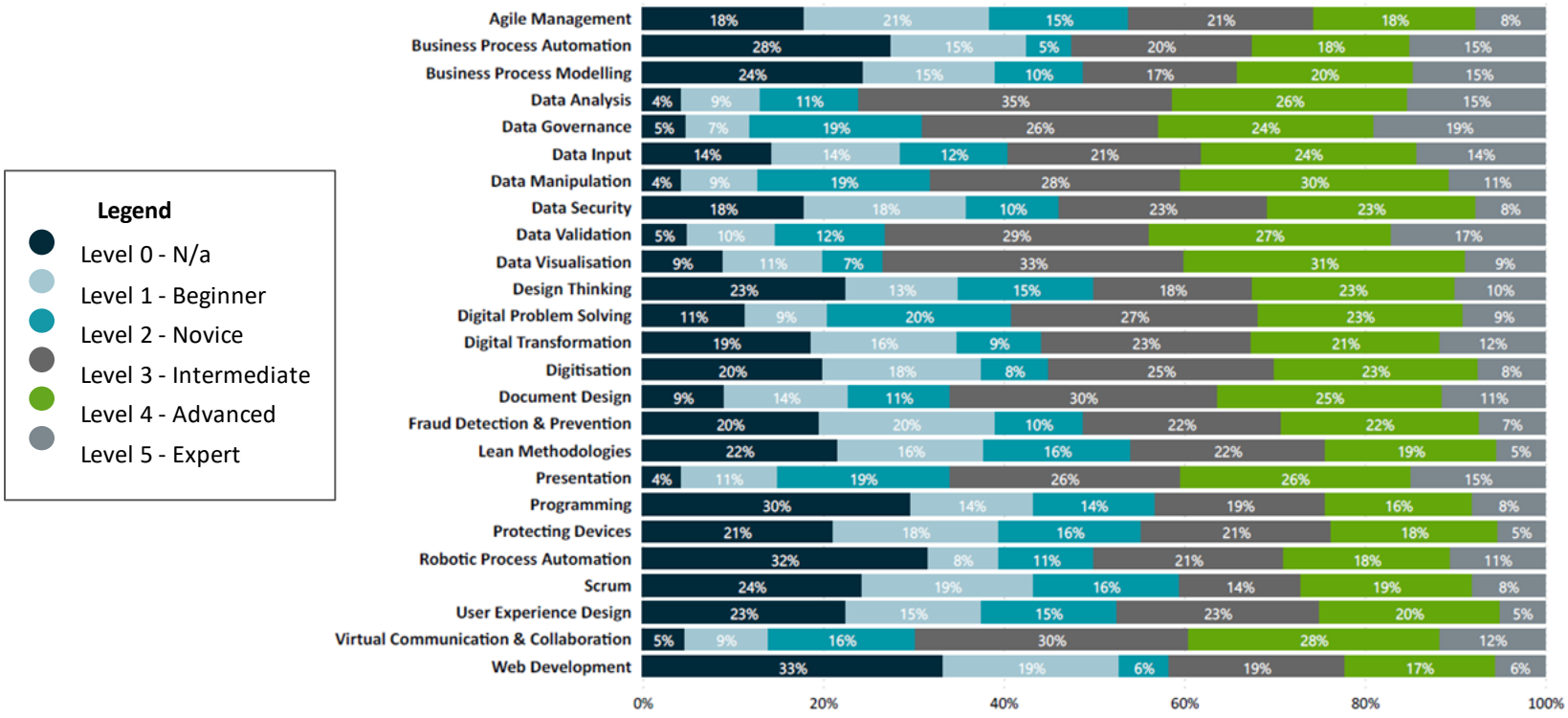
Appendix D: Breakdown of rating assigned to each skill - Engineering



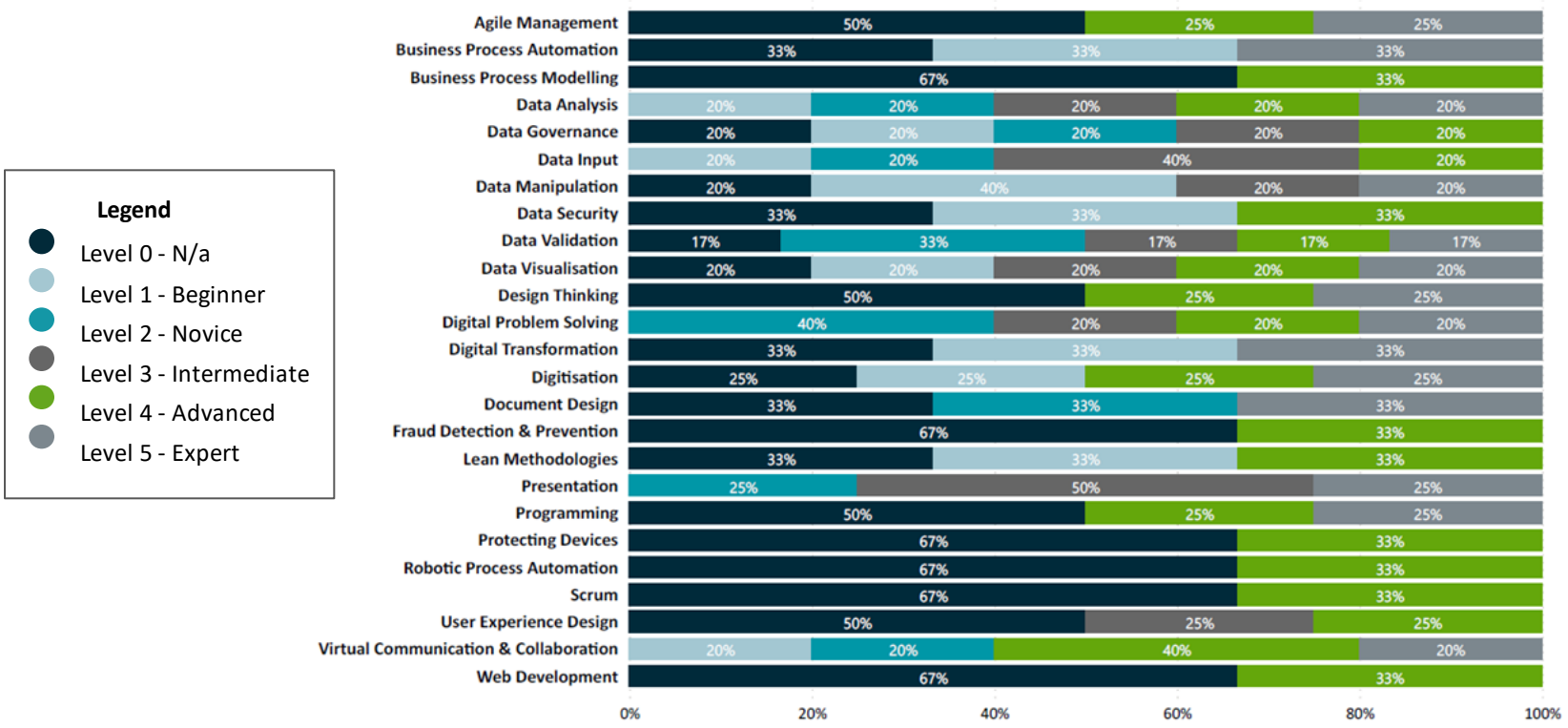
Appendix D: Breakdown of rating assigned to each skill - Technology



Appendix D: Breakdown of rating assigned to each skill - International Financial Services



Appendix D: Breakdown of rating assigned to each skill - Consumer & Business Services



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