Scoping: Digital, Data & Innovation Reference Model

Ruth Puttick, November 2020

About this paper

- This paper explores the research on the capabilities which organisations require in digital, data, and innovation. It starts by discussing the key terms, and how these are defined in different studies and by various organisations. It goes on to provide summaries of key research sources, including an overview of key findings, definitions, and relevance. The following section synthesises these sources to create tables of competencies, and associated job roles, across digital, data and innovation, and in this section there is also discussion on the similarities and overlaps of the capabilities needed in each of these domains. The next section provides case studies to help articulate these capabilities and make the case for the value they can bring to local government. The paper concludes with ideas for future research, a note on the methodology, and in the annex, there are example job roles.

- This paper is based on a rapid review of the literature conducted during October and November 2020. It is a scoping study for a work package to create a tool that describes the skills, roles, ways of working and example technologies required in any digital, data, innovation team/department. It will provide a common language for these capabilities, assisting professionals to map out what they have and what they need. Furthermore, it will provide a baseline for organisations, managers, and other public sector staff to assess the current situation and, importantly, fill any gaps in a targeted way.

- We are keen to hear about additional sources of research and organisations which we could explore and learn from.

1. Summary of key findings

- This literature review sought to identify capability frameworks for digital, data, and innovation in city and local government. It is worth emphasising why capabilities matter. For local authorities - and for those in the private and not-for-profit sectors - capabilities define the required skills, processes, tools, and knowledge, required to successfully deliver value and impact.
- It is clear from the literature that there is a lack of definition of what constitutes “digital”, “data”, and “innovation”. This is problematic for several reasons. Firstly, there is no common language, secondly, it is hard to determine what capabilities are needed for each of these to have impact, and thirdly, it is difficult to compartmentalise them as separate domains.
- We have not identified a capability framework which addresses our aims. This means, that relevant points have been taken from various frameworks to start creating three new capability frameworks. These are not finished, but initial development can be seen in section 4.
- There are overlaps between the three capability frameworks. For example, across the digital, innovation and data capability frameworks, there are similar themes of the need for a clear strategy, and a strategy which is reflected and refreshed when required, effective leadership, project and programme management, ongoing training, and a positive working culture. The role of “customers” and “users” is frequently emphasised, as both a source of new ideas, and to involve in developing and testing new solutions. These points are discussed further in section 5.

The paper is split into the following sections:

2. Glossary of key terms

As discussed in Section 3, few of the sources offer up definitions for digital, data and/or innovation. This section summarises the available definitions.

Digital

The JISC define digital as:

- *"Digital capability is the term we use to describe the skills and attitudes that individuals and organisations need if they are to thrive in today's world.*
- *At an individual level we define digital capabilities as those which equip someone to live, learn and work in a digital society.*
- *At an organisational level we need to look beyond the capabilities of individuals and consider the extent to which the culture and infrastructure of an institution enables and motivates digital practices."*

Peter James Thomas define digital [department] as: :

- *"Digital is the name often given nowadays to the part of a company that deals with its web-presence and mobile applications; i.e. is concerned with creating content for web-sites and tablets. Historically, Digital used to be a preserve of the IT function, often it is now a stand-alone area, often closely aligned with, or indeed part of, Marketing. A Digital department will have its own in-house people, but will often outsource most of the heavy lifting to one or more Digital Agency, which will have the whole range of capabilities from design and creatives to build and run. Given that Digital front-ends nearly always have to interface with internal systems, Digital will work closely with IT. They will typically also have a Web Analytics area, which may have a formal or informal relationship with an Analytics team within a Data Function." "*[i]

Innovation

OECD define innovation in their Innovative public sector organisations report as:

- *"Innovation is seen as a transformative strategy which can address the many challenges governments are facing today*".

The SFIA define innovation as:

- *"The capability to identify, prioritise, incubate and exploit opportunities provided by information, communication and digital technologies. To develop and implement processes, tools and infrastructures to support innovation. To involve internal and external communities, employees, commercial partners, customers, users and other stakeholders in the innovation process. To provide governance, monitoring to, and reporting on, the innovation process."*

Data

IBM define data science as:

- *"Data science is a cross-disciplinary set of skills found at the intersection of statistics, computer programming and domain expertise. It comprises three distinct and overlapping areas: 1 Statistics, to model and summarize data sets 2 Computer science, to design and use algorithms to store, process and visualize data 3 Domain expertise, necessary to formulate the right questions and to put the answers in context"*

Peter James Thomas define data as:

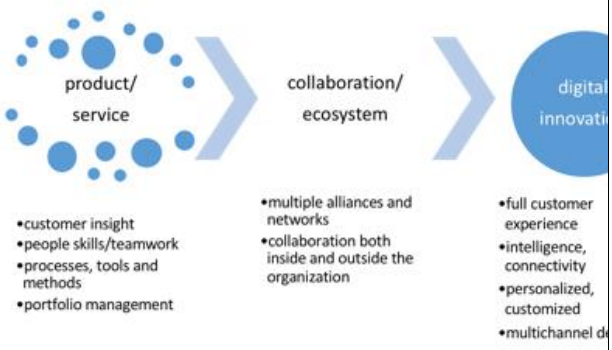
- *"Originally the plural form of the Latin word datum. In itself, datum is a past participle of the Latin verb dare (do, dare, dedi, datus) meaning "to give"; hence words like "donor" and "donate" in English and donner, which is the verb "to give" in French (English "give" comes instead from the German geben). The word datum means "something that is given" and is used to mean measurements taken, counts performed, or facts known / obtained. Thus Data refers to many such quantities or facts. Archaic usage would suggest forming sentences such as "the datum was gathered" and "the Data were gathered", however common English long ago embraced Data as a singular / collective noun, so "the Data was gathered" is perfectly acceptable in all but the most pedantic of circles. With the advent of machines that could store and manipulate measurements and facts (aka computers, electronic or otherwise) the word Data came to be associated with the raw material of electronic processing; originally numbers, text, dates and so on (the text and dates normally being numbers in disguise of course), latterly images, sound, video etc. (also numbers when boiled down to the essentials). Computers store Data (facts and figures) in a variety of ways and use it to create more Data, which can be provided to users, transmitted to other computers, or once more stored. Electronic Data is typically stored in binary format"*[ii]

3. Overview of each data source

3.1 JISC Digital capabilities framework: the six elements defined

- **What it is**: *"it has most often been used by digital leaders and staff with an overall responsibility for developing digital capability in their organisation."*
- **Summary of key points**:
  - JISC have used the framework to develop a series of 'role profiles' which highlight the digital capabilities that are relevant to particular roles. In addition, there are questions to help individuals reflect on their digital capabilities and identify current strengths and areas for development.
  - In addition the Framework, JISC has produced role profiles, although these are aimed at a HE/university setting.
- **Definitions of key terms:**
  - *"Digital capability is the term we use to describe the skills and attitudes that individuals and organisations need if they are to thrive in today's world.*
  - *At an individual level we define digital capabilities as those which equip someone to live, learn and work in a digital society.*
  - *At an organisational level we need to look beyond the capabilities of individuals and consider the extent to which the culture and infrastructure of an institution enables and motivates digital practices."*
- **Note on relevance:**
- **Available at:** http://repository.jisc.ac.uk/7278/1/BDCP-DC-Framework-Individual-6E-110319.pdf

3.2 Innovation Edge – Digital Innovation – The 3 key capabilities you need to remain competitive



- **What it is**: *"In our experience, innovation capabilities progress from product/service to digital innovation. […] While the capabilities overlap, they also build on each other" – see diagram*
- **Summary of key points**:

  Details three capabilities:

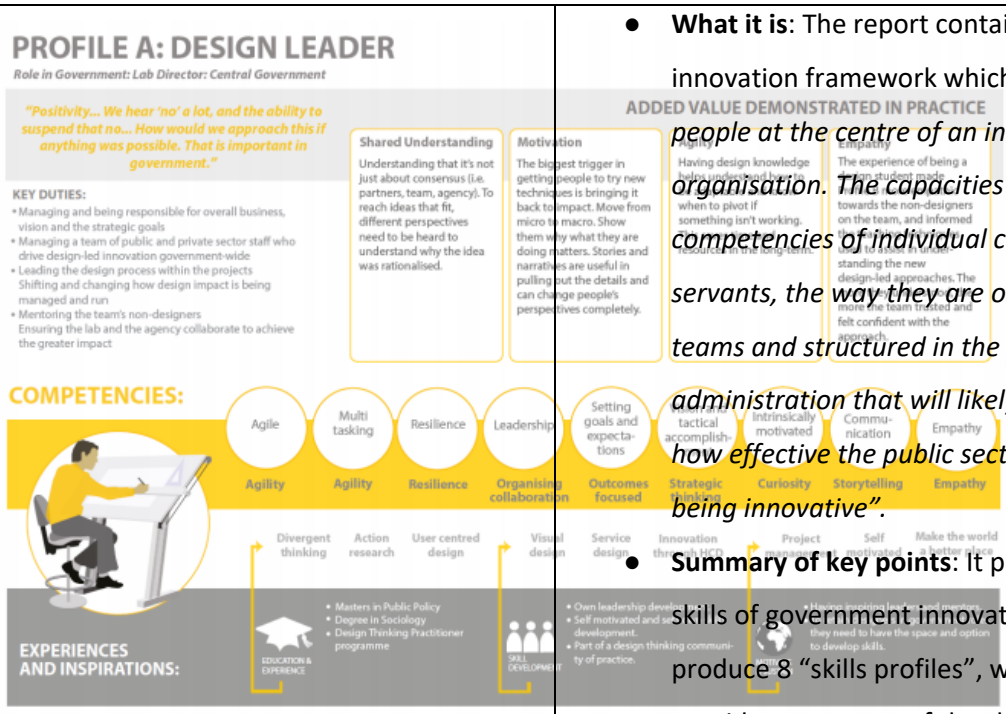
  1. Product/service innovation
  2. Collaborative innovation
  3. Digital innovation

  Further details are provided in the tables below.
- **Definitions of key terms:** no clear definitions provided.
- **Note on relevance**: Limited further details on capabilities.
- **Available at:** https://innovationedge.com/2019/03/11/digital-innovation-the-3-key-capabilities-you-need-to-remain-competitive/

3.3 OECD Observatory of Public Sector Innovation: Leadership and HR strategies for building innovative public sector organisations. June 2018

- **What it is**: "The intent of this study is to increase visibility with the most common tactics that leadership and HR are using to build innovative organisations."
- **Summary of key points**:
  - Aimed at the public sector, it draws on case studies to
  - It identifies "levers" available to leaders to build public sector innovation capacity. However, there is limited details on
  - In addition to skills for innovation, it advocates a wider culture change, "*mindset, attitudes and behaviours can be just as important as specific hard or soft skills in enabling innovation within the public sector.* [There are] *a number of other organisational factors that are also crucial for increasing levels of innovation in the public sector. In particular, having leadership capability, organisational culture and corporate functions/systems (finance, HR, IT, legal) that are enablers of innovation, not 'blockers'*." P. 9
- **Definitions of key terms: "***Innovation is seen as a transformative strategy which can address the many challenges governments are facing today*". (p. 7)
- **Note on relevance**: Limited further details on the exact skills and capabilities needed, beyond recognising the importance of recruitment.
- **Available at:** https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5bc05b7d7&appId=PPGMS

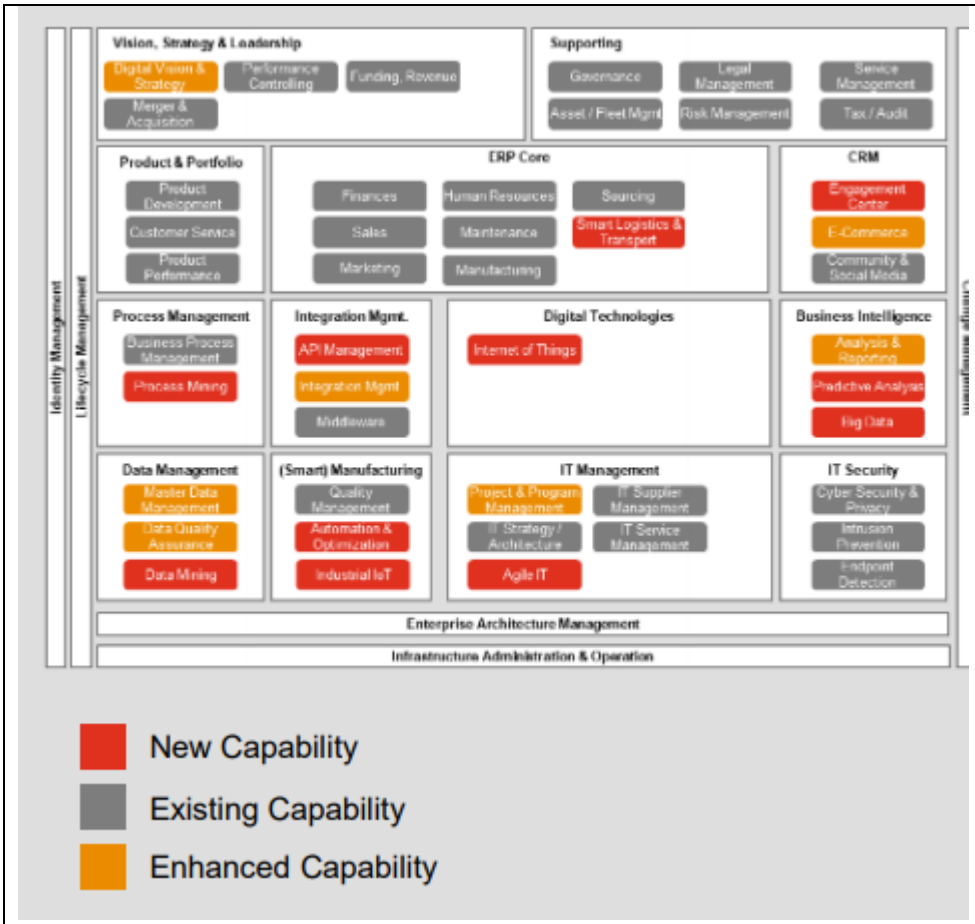
3.4 OECD Core Skills for public sector innovation: a beta model of skills to promote and enable innovation public sector organisations. April 2017



- **What it is**: The report contains an innovation framework which *"puts people at the centre of an innovative organisation. The capacities and competencies of individual civil servants, the way they are organised in teams and structured in the public administration that will likely determine how effective the public sector is at being innovative"*.
- **Summary of key points**: It profiles the skills of government innovators to produce 8 "skills profiles", which provide a summary of the skills and competencies to generate the model of core skills for public sector innovation. An example is shown opposite. The role profiles include design, innovation lab director, strategic designer, user researcher/ service designer, and data analyst.
- **Definitions of key terms:**
- No definition of innovation provided.
- **Note on relevance**: It may be too focussed on soft skills, but the profiles on p. 22 onwards could provide useful inputs, and a prompt for a template.
- **Available at:** https://www.oecd.org/media/oecdorg/satellitesites/opsi/contents/files/OECD_OPSI-

	core_skills_for_public_sector_innovation-201704.pdf

3.5 PwC CIO Advisory Services: Shaping the Digital Capability Driven Architecture. 2019



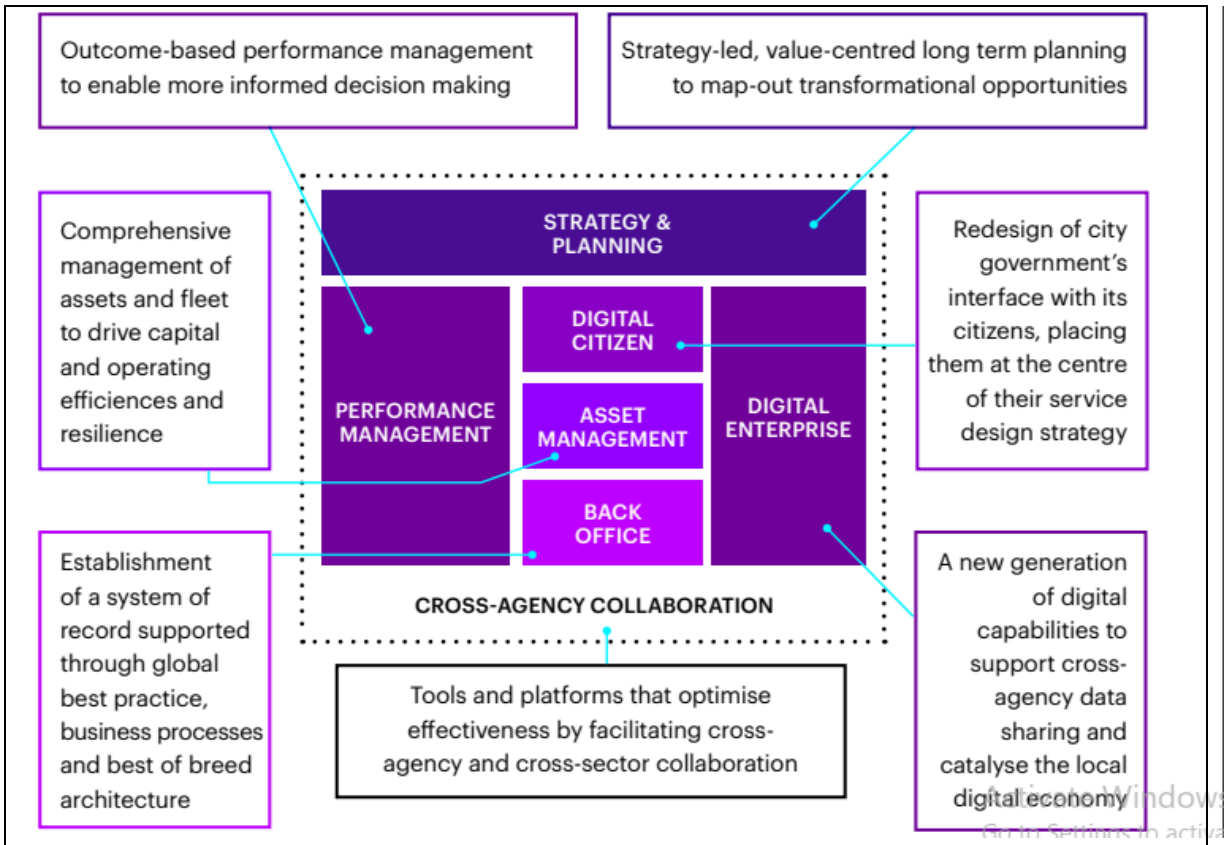
- **What it is**: The report describes how a "capability driven planning approach helps organisations to evaluate their current capabilities against the new business model, identify gaps and determine measures to close the gaps. For example, adding new capabilities might result both in acquiring new skills, making changes to the organisation and implementing new technology. A consolidated transformation plan covering all aspects of the capability framework, helps to prioritise and implement the programs, initiatives and investments needed. Initiatives already underway that do not support the new business model will be cancelled" (p. 6)
- **Summary of key points**:
  - It provides the steps firms could follow to 1) assess the current capability system and its fit for the new digital business model; 2) identify gaps; and 3) develop new digital capabilities.
  - Furthermore, it raises important questions about what constitutes "digital". It argues that "Digitization has many meanings. For some, it is the introduction of entirely new technologies such as artificial intelligence or robotics. For others it is also about modernizing their corporate structure (e.g. Lean), methods (e.g. Agile)

and ways of thinking (e.g. Design Thinking). From the point of view of capability design, digitization always has an impact on all areas of an organization: the introduction of new technologies should always go hand in hand with the adaptation of processes, competencies, and organisational structures of a company that make up the capability" (PwC 2019 p. 11).

- **Definitions of key terms:**
  - None provided
- **Note on relevance**: it provides useful considerations on definitions, why building capabilities are important, and the need to take one "enterprise" approach, but it is possibly to corporate/private sector focused.

Available at: https://www.pwc.de/de/strategie-organisation-prozesse-systeme/shaping-the-digital-capability-driven-architecture.pdf

3.6 Accenture: Capabilities for tomorrow's Digital City Hall: Accenture's High Performing City Operating Model. 2017

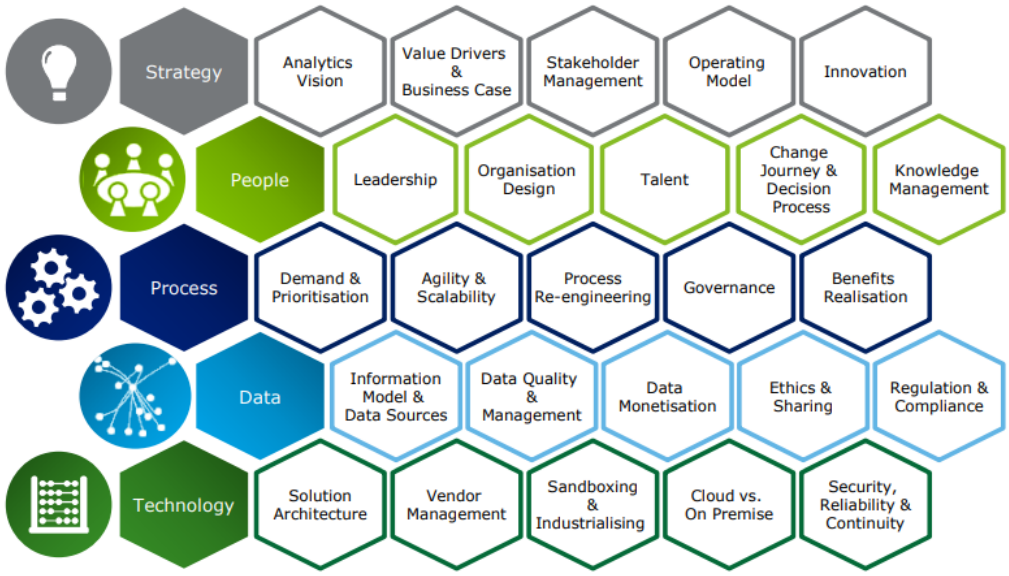


- **What it is**: "the model defines the key building blocks of a modern city government's capability framework." (p. 2)
- **Summary of key points**: it advocates why a capability framework is important to city government, but lacks detail on what it looks like in reality.
- **Definitions of key terms:**
- None provided.
- **Note on relevance**: This report is more of a sales pitch, than a useable research document.

Available at: https://www.accenture.com/t00010101T000000Z__w__/au-en/_acnmedia/PDF-60/Accenture--City-Operating-Model-AUS

3.7 Belfast City Council ICT Strategy 2018 -2021. By Deloitte, 2018

Becoming an Information Driven Organisation relies on the fundamental building blocks of Strategy, People, Process, Data and Technology. For each of those building blocks, the various concepts and design questions that the Council must consider as it embarks upon a journey towards becoming an Information Driven Organisation are illustrated in the following diagram.

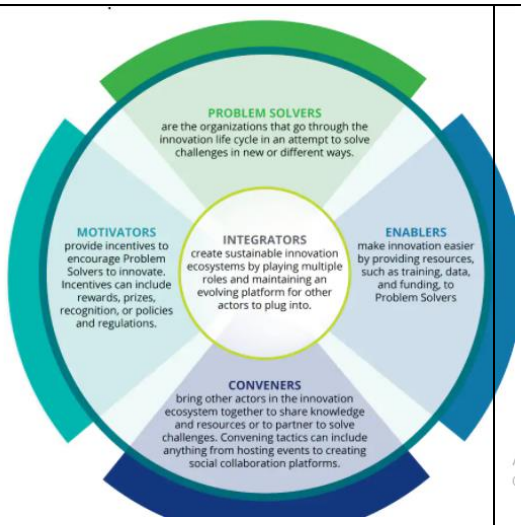


- **What it is**: The ICT strategy for Belfast city council, produced by Deloitte. It covers "*six ICT Strategic Themes to provide clarity around technology direction for the Council*" (p. 2)
- **Summary of key points**: It describes the problems and challenges facing Belfast city council, and an ICT strategy to overcome these. It sets out technology which could assist, such as Robotic Process Automation, AI, Augmented Reality, Transformation Technology, Internet of Things, Wearable Technology, 3D Printing, and Smart Scheduling. However, it lists these, rather than talking about their application and delivery. It tends to focus on softer, less tangible skills and culture building.
- **Definitions of key terms:**
- "Digital Services is an internal service providing technology services to the rest of the Council. This involves the provision and maintenance of the telephony, network and server facilities, supply and maintenance of computer hardware and acquisition, supply of software and training, and reprographics. In addition, Digital Services also has an external portfolio of business, which supplies systems to the Northern Ireland Housing Executive, local Councils in Northern Ireland and other public bodies throughout the UK."
- **Note on relevance**: This report usefully sets out the strategy for a city government, but it lacks specific details on capabilities.

Available at:

https://minutes3.belfastcity.gov.uk/documents/s75470/Appendix%203%20Belfast%20City%20Council%20-%20ICT%20Strategy%202018-2021.pdf

3.8 Catalyzing public sector innovation. By Alan Holden, Sonora Braun, Lilian Lee, Abigail Phelps, Rachel Samuelson, Deloitte, 2017

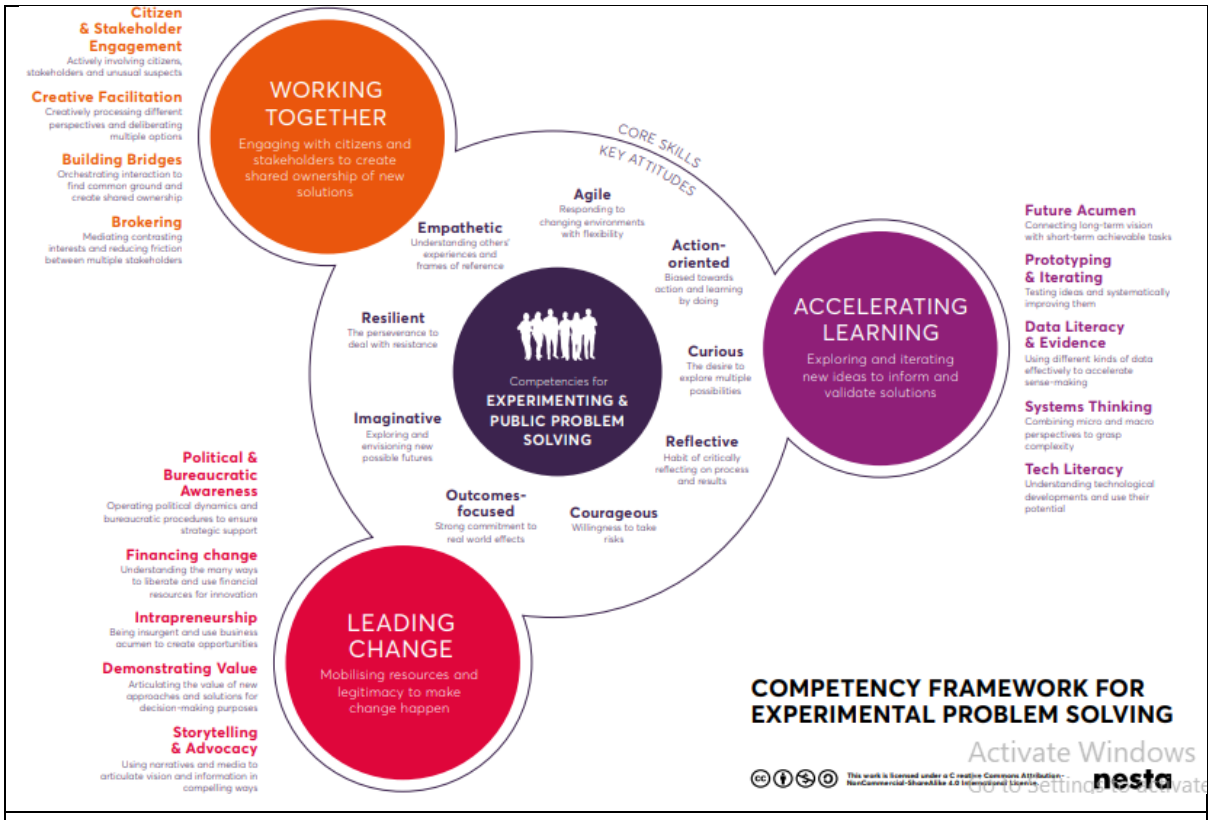


- **What it is**: It details the five key roles that public sector organisations can play to help address societal challenges.
- **Summary of key points**: It analyses 100 innovation initiatives focused on societal challenges across the United States and found that nearly every effort—regardless of whether they are launched by a private sector company, a non-profit organization, a foundation, an individual, or a government agency—involves organizations playing at least one of five key roles. These roles are:
    - Developing innovative solutions
    - Giving others the tools or resources to make innovation easier
    - Creating incentives to spur innovation
    - Bringing various actors together to collaborate through the innovation process
    - Establishing and/or sustaining the innovation ecosystem as a whole.
- **Definitions of key terms:**
    - No definition of innovation provided.
- **Note on relevance**: This report usefully sets out developing an innovation strategy, with questions for consideration, but it does not provide much detail on the "how".

Available at:

https://www2.deloitte.com/uk/en/insights/industry/public-sector/catalyzing-public-sector-innovation-initiatives.html

3.9 Skills, attitudes and behaviours that fuel public innovation A guide to getting the most from Nesta's Competency Framework for Experimenting and Public Problem Solving. By Nesta, 2019.



What it is: "*The competencies are framed around experimental problem solving to emphasise what teams of public servants need to do in order to tackle those complex or 'wicked problems' that governments across the world face. It also shifts the focus from individuals using or learning a single innovation method (like Human Centred Design) to teams making the most of the array of approaches available to them. We don't believe in heroic individuals; true innovation comes from empowered teams.*" P. 2.

Summary of key points: There are three parts to the framework (see diagram above):

1. The central circle. The desired focus of innovative teams: to solve problems through experimenting.
2. Attitudes. These surround the core aim, and create the fertile ground for experimenting and public problem solving. It is important to take into consideration attitudes when hiring people for roles.
3. Core skills categories. These are three distinct skill areas:

a. Working together: engaging citizens and stakeholders to create shared ownership of new solutions.
b. Accelerating learning: exploring, testing and developing new ideas to inform and validate solutions.
c. Leading change: creating space for innovation and driving change processes to mobilise people, inspire action and ensure strategic outcomes. Mobilising resources and creating legitimacy to make change happen.

4. **Definitions of key terms:**

5. **Note on relevance**: This report usefully sets out developing an innovation strategy, but it is written more as a toolkit for organisations to work through, with prompts and questions for consideration, rather than detail on specific capabilities.

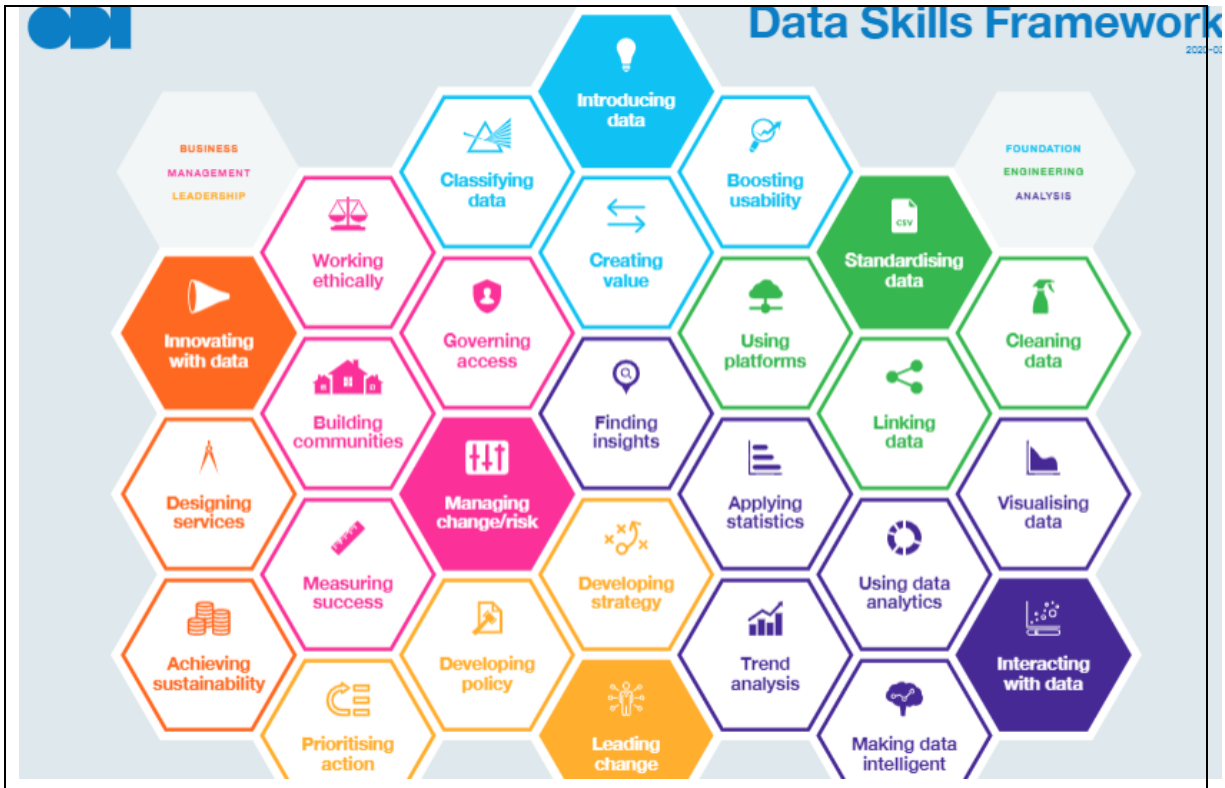
6. **Available at:** https://media.nesta.org.uk/documents/Nesta_CompetencyFramework_Guide_July2019.pdf

3.10 City Hall Innovation Team Playbook: The Innovation Delivery Approach to Develop and Deliver Bold Innovation. By Bloomberg Philanthropies. 2014.

- **What it is**: *"The Innovation Delivery approach builds on best practices from around the world. It combines proven strategies to generate innovative approaches with exceptional project management techniques that reliably deliver results. Innovation teams focus not just on the development of new ideas, but also their successful implementation*". P. 4.
- **Summary of key points**: The Innovation Delivery approach using a series of steps for tackling difficult problems at the city level. The approach's four core steps are depicted in the diagram above. The approach emphasises:
    - Commitment to data. A relentless focus on using information to understand a problem—how things are working, trends over time, what has been tried and to what effect—underpins successful development and implementation.
    - Careful exploration of what has worked before. Existing solutions that have been successful elsewhere are often promising pathways. If you know what works, adopt it and adapt it.
    - Space and techniques to generate new ideas. Dedicated time, tested strategies, and a bold philosophical imperative to expand thinking and engage new voices.
    - Structured project and performance management. New ideas are developed into detailed implementation plans. Proven techniques are used to establish specific, measurable targets for the impact of the work, as well as a process for regular assessment and reflection on progress toward these targets.
    - Engaging partners. The approach is collaborative, and its success depends on the involvement of a range of players—city agencies, county, state, and national governments, not-for-profits, chambers of commerce, community groups—to leverage one another's influence to get the job done.

- In addition, the report details the capabilities and critical skills the innovation team should possess:
    - Project management
    - Knowledge of city government
    - Analytical capabilities (i.e., quantitative data analysis and qualitative investigation such as research, interviews, and observations)
    - Creative thinking skills and the inclination to constantly challenge and test assumptions
    - Problem solving and critical thinking
    - Strong oral and written communication skills
    - Ability to work with people at all levels of government
    - Exceptional drive for impact
- **Definitions of key terms:**
    - This document does not provide a definition of innovation.
- **Note on relevance**: This report clearly sets out what an innovation team is and how to create one. It provides details on the key roles, how to choose and communicate priority areas, how to hire and structure the team, and how to move into delivery.
- **Available at:** https://www.bbhub.io/dotorg/sites/2/2014/08/Innovation-Team-Playbook_2015.pdf

3.11 Data Toolkit for Business: Methodology and Training Tools. By ODI, 2020



- **What it is**: *"a set of collaborative tools that will help businesses unlock the value of data."* P. 8.
- **Summary of key points**: The toolkit includes:
  - The Data Skills Framework to help business develop an effective balance of data skills.
  - Data Ecosystem Mapping to help business understand how value flows through the business ecosystem, and to plan the technical and organisational relationships needed to make the most of data held internally and by other organisations.
  - Data Ethics Canvas to help identify and mitigate potential ethical issues when collecting, using and sharing data.

  These tools are intended to help stimulate conversation in a group setting – such as a team meeting, project review or workshop – or more directly to inform changes at an individual level.

  - The Data Skills Framework (see diagram) is particularly it relevant. It divides the data capabilities needed into five categories:
    - Business
    - Management

    - Leadership
    - Foundation
    - Engineering
    - Analysis
- **Definitions of key terms:**
    - No definitions provided.
- **Note on relevance**: The Data Skills Framework identifies the broad range of skill a business needs to get value from data, including data analytics, programming and visualisation, and it also shows the role of strategy, innovation and ethics.
- **Available at:** http://theodi.org/wp-content/uploads/2020/06/ODI_Data_Toolkit_for_Business_2020_WEB_72ppi.pdf

3.12 The Data Science Skills Competency Model A blueprint for the growing data scientist profession. By IBM, 2020.

Statistics and programming foundation

1.0 Understand sampling, probability theory, and probability distributions
2.0 Demonstrate knowledge of descriptive statistical concepts
3.0 Demonstrate knowledge of inferential statistics
4.0 Demonstrate knowledge of Python programming skills
5.0 Implement descriptive and inferential statistics using Python
6.0 Demonstrate ability to visualize data and extract insights
7.0 Demonstrate through a project the ability to analyze a dataset and communicate insights

Data science foundation

8.0 Demonstrate understanding of what is data science and what data scientists do
9.0 Demonstrate ability to characterize a business problem
10.0 Demonstrate ability to formulate a business problem as a hypothesis question
11.0 Demonstrate use of methodologies in the execution of the analytics cycle
12.0 Demonstrate through a project the ability to plan for the execution of a project

Data preparation

13.0 Demonstrate ability to identify and collect data – multiple formats
14.0 Demonstrate ability to manipulate, transform, and clean data
15.0 Demonstrate expertise with techniques to deal with missing values, outliers, unbalanced data, as well as data normalization
16.0 Demonstrate through a project the ability to construct usable data sets

Model building

17.0 Demonstrate understanding of Linear Algebra principles for machine learning
18.0 Demonstrate understanding of different modeling techniques
19.0 Demonstrate understanding of model validation and selection techniques
20.0 Communicate results translating insight into business value
21.0 Demonstrate through a project the ability to test different models on a dataset, validate and select the best model, and communicate results

Model deployment

22.0 Deploy and monitor a validated model in an operational environment
23.0 Demonstrate through a project the ability to deploy and use a deployed model

Big data foundation

24.0 Understand the concept of big data, and how big data is used at organizations
25.0 Understand with the big data ecosystem and its major components
26.0 Demonstrate through a project expertise with big data platforms (Hadoop, Spark)

Leadership and professional development skills

27.0 Participate as a data scientist on client engagements (internal or external)
28.0 Contribute to the profession by teaching or mentoring others

- **What it is**: *"The Data Science Competency Model identifies and defines the skills required by a data scientist to be successful within the enterprise data science workflow. Organizations will have a model to guide the selection or development processes for data scientists for today's competitive environment*." P. 5.
- **Summary of key points**:
  - The Data Science Competency Model takes each of the competencies detailed in the screenshot above and details 1) the competency outcomes; 2) assessment criteria; and 3) evidence type.
  - It's organized into the following seven areas, combining foundational skills with enterprise data science workflow skills:
    - 1) Statistics and programming foundation. The competencies in this area are focused on the knowledge of key statistics concepts and methods essential to finding structure in data and making predictions. Further, job

candidates must have Python programming skills—or other statistical programming skills—and the ability to visualize data, extract insights and communicate the insights in a clear and concise manner.

- 2) Data science foundation. A data scientist must be able to: – Characterize a business problem – Formulate a hypothesis – Demonstrate the use of methodologies in the analytics cycle – Plan for the execution Understanding the data science workflow and recognizing the importance of each element of the process is critical for successful implementations.
- 3) Data preparation. To ensure the data scientist can construct usable data sets, the key competencies required are: – Identifying and collecting the data required – Manipulating, transforming and cleaning the data. A data scientist must also demonstrate the ability to deal with data anomalies such as missing values, outliers, unbalanced data and data normalization.
- 4) Model building. This stage is the core of the data science execution, where different algorithms are used to train the data and the best algorithm is selected. A data scientist should know: – Multiple modelling techniques – Model validation and selection techniques What differentiates a data scientist is understanding the use of different methodologies to get insight from the data and translating the insight into business value.
- 5) Model deployment. An ML model is valuable when it's integrated into an existing production environment and used to make business decisions. Deploying a validated model and monitoring it to maintain the accuracy of the results is a key skill.
- 6) Big data foundation. Organizations deal with large volume of structured and unstructured data. A data scientist must demonstrate understanding of how big data is used, the big data ecosystem and its major components. The data scientist must also demonstrate expertise with big data platforms, such as Hadoop and Spark.
- 7) Leadership and professional development. Data scientists must be good problem solvers. They must understand the opportunity before implementing the solution, work in a rigorous and complete manner, and

explain their findings. A data scientist needs to understand the concepts of analyzing business risk, making improvements in processes and how systems engineering works. In addition to detailing the competencies, the model provides foundational performance criteria. Candidates and programs—such as data science undergraduate or graduate programs, or a set of courses in a massively open online course (MOOC)—can be evaluated using a common measurement system.

- **Definitions of key terms:**
    - "Data science is a cross-disciplinary set of skills found at the intersection of statistics, computer programming and domain expertise. It comprises three distinct and overlapping areas: 1 Statistics, to model and summarize data sets 2 Computer science, to design and use algorithms to store, process and visualize data 3 Domain expertise, necessary to formulate the right questions and to put the answers in context"
- **Note on relevance**: The Data Science Skills Competency Model provides a detailed guide on how to hire a data scientist.
- **Available at:** https://www.ibm.com/downloads/cas/7109RLQM

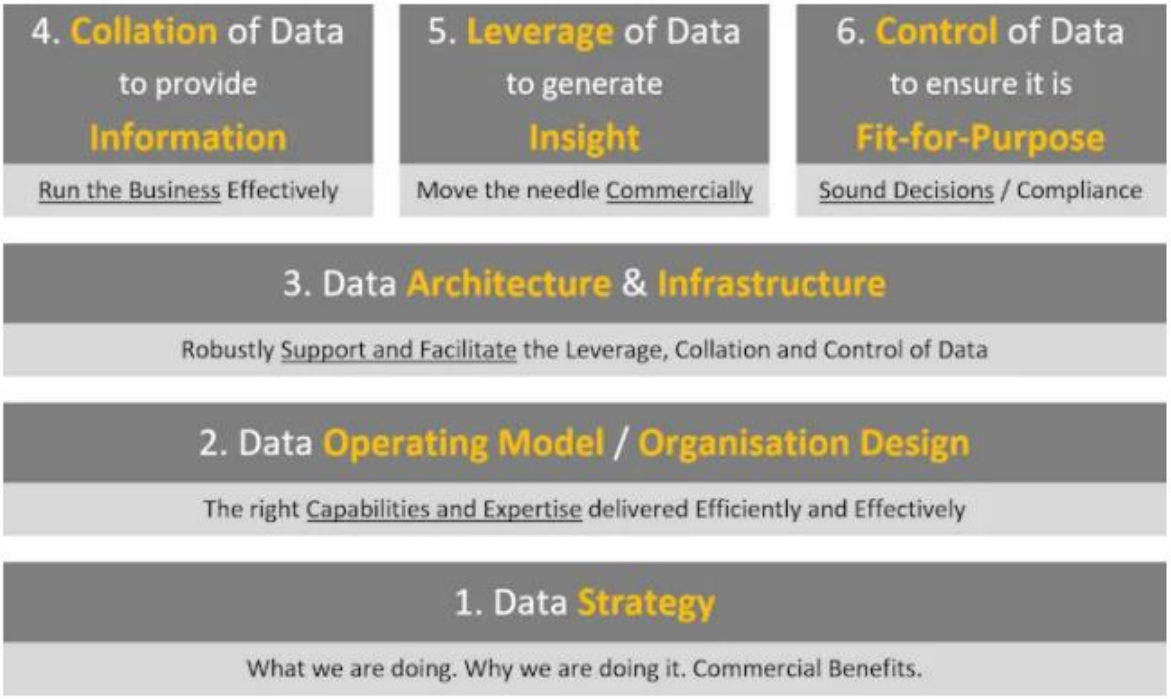
3.13 The Skills Framework for the Information Age [SFIA 7].

Enterprise IT governance	Strategic planning
Information governance	Information systems coordination
Information security	Information assurance
Analytics	Data visualisation
Information content publishing	Consultancy

- **What it is**: *"SFIA 7 is the current version of the Skills Framework for the Information Age. […] The SFIA standard covers the full breadth of the skills and competencies related to information and communication technologies, digital transformation and software engineering. SFIA is also often applied to a range of other technical endeavours."*
- **Summary of key points**: The structure of SFIA is seven levels of responsibility characterised by generic attributes, along with many professional skills and competencies described at one or more of those 7 levels. New themes in the latest version are: software engineering; cyber security; digital transformation; agile & DevOps; big data and informatics; and knowledge.
- **Definitions of key terms:**
  - **Innovation:** "The capability to identify, prioritise, incubate and exploit opportunities provided by information, communication and digital technologies. To develop and implement processes, tools and infrastructures to support innovation. To involve internal and external communities, employees, commercial partners, customers, users and other stakeholders in the innovation process. To provide governance, monitoring to, and reporting on, the innovation process."

- **Note on relevance**: This provides a very comprehensive list of skills and capabilities. There is overlap between digital and innovation.
- **Available at:** https://sfia-online.org/en/sfia-7

3.14 A Simple Data Capability Framework. By Peter James Thomas, 2019



- **What it is**: *"peterjamesthomas.com is an extensive resource covering recommended best practice in the Data to Information to Insight to Action journey."*
- **Summary of key points**:
  - The website contains details the importance of data and analytical capabilities, and how these can be organised.
  - Rather than focussing on specific job roles, and getting stuck on nomenclature, he focusses on areas of work in the organogram.
  - The website contains a very useful dictionary/glossary of key terms in the data and analytics field.

- **Definitions of key terms:**
  - **Data:** *"Originally the plural form of the Latin word datum. In itself, datum is a past participle of the Latin verb dare (do, dare, dedi, datus) meaning "to give"; hence words like "donor" and "donate" in English and donner, which is the verb "to give" in French (English "give" comes instead from the German geben). The word datum means "something that is given" and is used to mean measurements taken, counts performed, or facts known / obtained. Thus Data refers to many such quantities or facts. Archaic usage would suggest forming sentences such as "the datum was gathered" and "the Data were gathered", however common English long ago embraced Data as a singular / collective noun, so "the Data was*

gathered" is perfectly acceptable in all but the most pedantic of circles. With the advent of machines that could store and manipulate measurements and facts (aka computers, electronic or otherwise) the word Data came to be associated with the raw material of electronic processing; originally numbers, text, dates and so on (the text and dates normally being numbers in disguise of course), latterly images, sound, video etc. (also numbers when boiled down to the essentials). Computers store Data (facts and figures) in a variety of ways and use it to create more Data, which can be provided to users, transmitted to other computers, or once more stored. Electronic Data is typically stored in binary format"[iii]

- **Digital [Department]:** *"Digital is the name often given nowadays to the part of a company that deals with its web-presence and mobile applications; i.e. is concerned with creating content for web-sites and tablets. Historically, Digital used to be a preserve of the IT function, often it is now a stand-alone area, often closely aligned with, or indeed part of, Marketing. A Digital department will have its own in-house people, but will often outsource most of the heavy lifting to one or more Digital Agency, which will have the whole range of capabilities from design and creatives to build and run. Given that Digital front-ends nearly always have to interface with internal systems, Digital will work closely with IT. They will typically also have a Web Analytics area, which may have a formal or informal relationship with an Analytics team within a Data Function." "*[iv]

Note on relevance: This site provides a really detailed analysis of organisational design, and specific roles and capabilities.

- **Available at:** https://peterjamesthomas.com/2019/05/03/a-simple-data-capability-framework/

3.15 Government Digital Service

Roles your team must have

A team building a government service needs to have people with the following roles or skills either in the team or available to it:

- product manager
- service owner
- delivery manager
- user researcher
- content designer
- designer
- developer

- **What it is**: The Government Digital Service has a lot of resources and guidance on how to build a digital service in government. "*The Service Standard provides the principles of building a good service. This manual explains what teams can do to build great services that will meet the standard.*"
- **Summary of key points**:

It provides details on the following:

- Accessibility and assisted digital: Help and encourage people to use your service: accessibility, assisted digital, user support.
- Agile delivery: How to work in an agile way: principles, tools and governance.
- Design: Naming, structuring and scoping your service, prototyping, using design patterns and design training.
- Measuring success: How to use data to improve your service: measuring, reporting, analytics tools and techniques.
- Service assessments and applying the Service Standard: How to apply the new Service Standard, check if you need a service assessment, how to get your service on GOV.UK and how to become a service assessor.
- Technology: Choosing technology, development, integration, hosting, testing, security and maintenance.

    - The team: Managing a service team: recruiting the people you need, training and working with contractors.
    - User research: Understand user needs: plan research, prepare for sessions, share and analyse findings.
- **Note on relevance**: Very relevant, and high quality, with a lot of detailed guidance on skills and capabilities.
- **Available at:** https://www.gov.uk/service-manual

3.16 BCS Learning Capability Model Assess your IT capability and create an effective L&D strategy. By British Computing Society

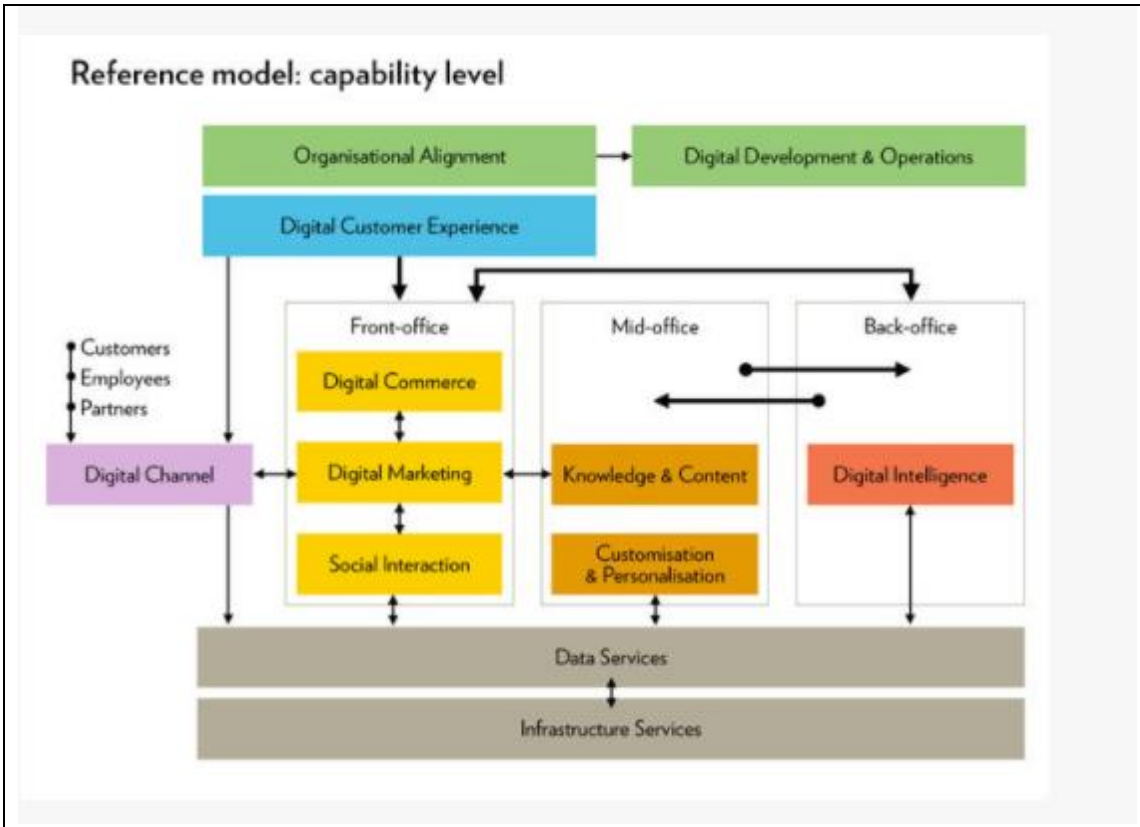
	Explorer	Enabler	Embedded	Expert	Exemplar
Business Drivers, HR and L&D strategy	May be caught by surprises in digital markets	Aware of, and acts on, obvious digital trends	Carefully monitors trends and acts early	Responds very quickly to build new digital skills	Rapid, agile transformations in response to digital trends
Business Benefits	Business benefits are not formally defined	Business benefits are stated and are reviewed by L&D	Business benefits drive investments in L&D and measures	Leaders state strategic benefits expected from L&D and measures	Explicit link between digital and IT skills and future markets
Leadership Commitment	No formal leadership buy-in. Local actions	Leaders have good oversight. Fragmented L&D systems	Clear top level commitment and HR co-ordinates	Explicit top-level commitment, effective HR and LMS in place	Leaders pioneer the digital skills agenda, and set-out funded plans
Talent and Leadership	Talent is not identified. ad-hoc, self- development	Talent is identified and developed, with limited support	Talent identified, developed using valid Leadership Framework	Talent formally identified, feeds into succession plans for roles	Talent nurtured and promoted into leadership and specialist roles
Competence, Gaps and Plans	Competence models not used	The use of competence models is patchy	Established use of valid IT model or framework (e.g. SFIA***plus***)	Active use of competence model, for gap analysis and plans	Structured competence systems fully exploited
Job Roles and Career Paths	Job roles are not defined and clear career paths are absent	Some job roles defined, using a wide variety of methods/formats	A valid job role model applied to key roles and clear career steps	Generic job roles are maintained and 1:1 career coaching is used	Specific job roles identified with links into talent management
Resources, Coaches, Mentors & Networks	Limited support and self-driven networking	Defined policy for support, some coaching is available	Structured and well-funded processes to support learners	High levels of support and commitment to professionalism	Wide networks and community of practice, and Academy style
Learning Outcomes and Skills Data	Unclear link of learning to role or standard	Learning is linked to industry standards and partly recorded	Learning is fully integrated into the HR L&D systems	Learning and skills are aggregated for individuals and across all teams	Learning loop is fully closed, and real time skills data is available

- **What it is**: "*Learning Capability Model (LCM) supports a holistic and systematic approach to assessing your current IT capability and maturity; identifying critical shortages; and creating a consistent and effective strategy to become a learning organisation in a fast-moving environment.*"
- **Summary of key points**:
  - The Learning Capability Model is used by the BCS to assess an organisation's It capability and maturity, and to help recruit and retain relevant staff. It appears to be used on a consultancy basis, and there are limited details on the model.
  - The BCS describe its use as "*assessment tools including online surveys to measure the effectiveness of your learning environment, your approach, focus and the culture of your IT department. Your organisation is measured in eight key business areas, against a five-step maturity scale moving from left to right*"
- **Definitions of key terms:**
  - The skill definitions and standards underpinning the model are aligned with the

- SFIA framework described above.

- **Note on relevance**: it appears to be focussed more on assessing maturity, than capabilities.
- **Available at:** https://www.bcs.org/media/1055/lcm-brochure.pdf

3.17 Digital Capability Reference Model (DCRM) for marketing & sales. By Free Range Future

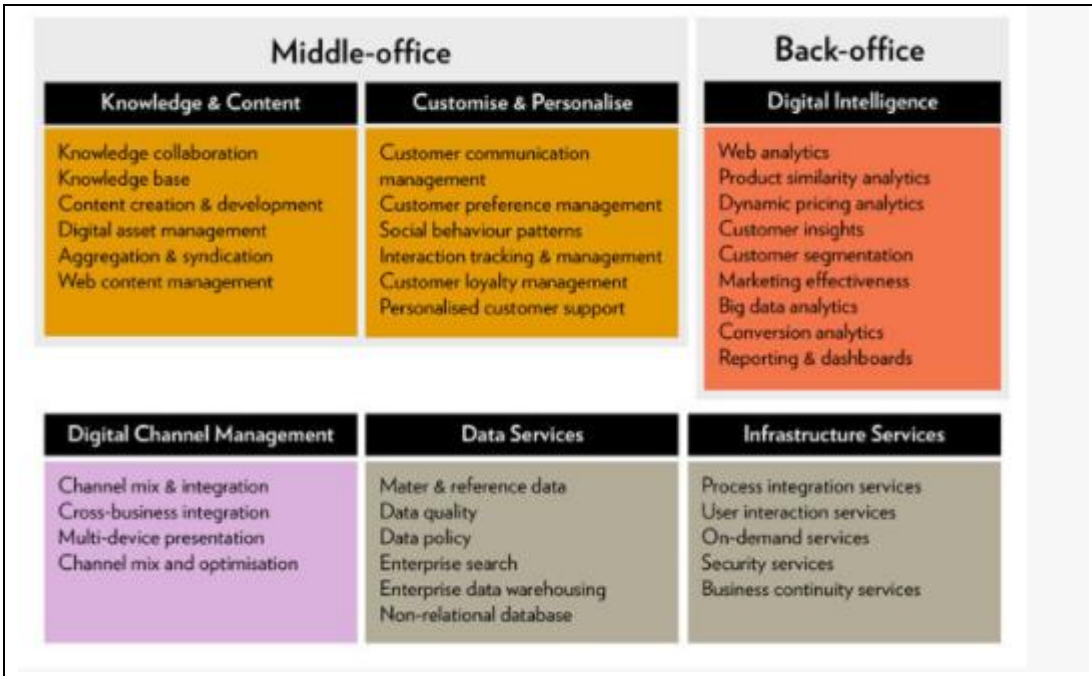


Reference model: sub-capability level

Organisational Alignment	Digital Develop & Operations	Digital Customer Experience
Digital innovation Digital planning Digital governance Cross-boundary collaboration Digital journey readiness	Program/project management Digital capability development Digital service introduction Digital design authority Digital quality Digital service operations	Customer journey User research Usability User experience design User experience testing

Digital Commerce	Digital Marketing	Social Interaction
Online merchandising Shopping cart & checkout Payments & reconciliation Order management & fulfillment Account management & self service	Digital brand marketing Campaign management Email marketing Mobile marketing Search engine optimisation Paid search Affiliate marketing Online advertising Marketing offer Marketing automation Content targeting Conversion rate optimisation	Social listening Social marketing Social servicing Online community Ratings & reviews Content moderation Crisis management

Front-office



- **What it is**: *"Digital Capability Reference Model (DCRM) for marketing & sales is a reference model that is used to diagnose and design business capabilities required for digital business with a heavy focus on the operational areas of marketing and sales. It is the foundation of the Freerange Digital Benchmark."*
- **Summary of key points**:
  - It consists of 12 capabilities and 76 sub-capability components to help benchmark digital capabilities of your organisation against best practice

    DCRM consists of front-office, mid-office and back-office
  - The full model is available to buy from Amazon.
- **Definitions of key terms:**
  - None seem to be available on the website, but they may exist in the paid-for version.
- **Note on relevance**: A useful characterisation of the capabilities needed, but it may be to corporate-focussed which might limit its relevant to a local authority audience.
- **Available at:** https://freerangefuture.com/introducing-the-digital-capability-reference-model/

4. Summary of the capabilities across digital, data, and innovation

This section summarises the types of capabilities within digital, data and innovation, a description of these, the associated job roles, interlinkages with other roles, the skills required, and what these capabilities enable the organisation to do. digital, data, and innovation, are taken in turn.

Before each are discussed, it is worth emphasising why capabilities matters. For local authorities - and for those in the private and not-for-profit sectors - capabilities define the required skills, processes, tools, and knowledge, required to successfully deliver value and impact. According to research conducted by PwC (2019 p. 4), using a capability driven planning approach can create a *"one enterprise view […] integrating people, information, process and technology – that enable the business to achieve its vision. In an ideal work, the framework of capabilities aligns all stakeholders from business and IT and guide strategic planning and decision-making in all areas of the organisation".*

The content of the tables below is taken from the sources listed in Section 4, with most content taken verbatim from these sources. The reference list provides a link to the original source.

These tables are also available in Google Docs.

Overlaps between the frameworks

There are overlaps between the three capability frameworks. For example, across the digital, innovation and data capability frameworks, there are similar themes of the need for a clear strategy, and a strategy which is reflected upon and refreshed, the need for effective leadership, project and programme management, ongoing training, and a positive working culture. The role of "customers" and "users" is frequently emphasised, as both a source of new ideas, and to involve in developing and testing new solutions. Innovation is also a feature in both the data and digital capabilities.

4.1 Digital

Types of capabilities	Description	Skills required	Job roles to deliver these capabilities	What this enables the organisation to do
ICT (Digital) proficiency[v]	● The use of ICT-based devices, applications, software and services. [vi]	● The confident adoption of new devices, applications, software and services and the capacity to stay up to date with ICT as it evolves. The capacity to deal with problems and failures of ICT when they occur, and to design and implement ICT solutions. [vii] ● An understanding of basic concepts in computing, coding and information processing. [viii]		
Digital productivity[ix]	● The use of ICT-based tools to carry out tasks effectively, productively and with attention to quality. [x]	● The capacity to choose devices, applications, software, and systems relevant to different tasks having assessed their benefits and constraints; and to adopt and (where necessary) adapt digital	Product management	

		tools to personal requirements such as accessibility. [xi] ● The capacity to work fluently across a range of tools, platforms and applications to achieve complex tasks. [xii] ● An understanding of how digital technology is changing practices at work, at home, in social and in public life. [xiii]		
Information Literacy[xiv]	● The capacity to find, evaluate, manage, curate, organise and share digital information. [xv]	● The capacity to interpret digital information for academic and professional/vocational purposes, and to review, analyse and re-present digital information in different settings. A critical approach to evaluating information in terms of its provenance, relevance, value and credibility. [xvi] ● An understanding of the rules of copyright and open alternatives eg Creative Commons, and of the ability to reference digital works appropriately in different contexts. [xvii]		

Data Literacy[xviii]	● The capacity to collate, manage, access and use digital data.	● The capacity to collate, manage, access and use digital data in spreadsheets, databases and other formats, and to interpret data by running queries, data analyses and reports. The practices of personal data security, [xix] ● An understanding of: how data is used in professional and public life; legal, ethical and security guidelines in data collection and use; the nature of algorithms; of how personal data may be collected and used. [xx]		
Media Literacy[xxi]	● The capacity to critically receive and respond to messages in a range of media.	● The capacity to critically receive and respond to messages in a range of media – text, graphics, video, animation, audio – and to curate, re-edit and repurpose media, giving due recognition to originators. A critical approach to evaluating media messages in terms of their provenance and purpose. [xxii]		

		● An understanding of digital media as a social, political and educational tool and of digital media production as a technical practice. [xxiii]		
Digital Creation [xxiv]	● The capacity to design and/or create new digital artefacts and materials.	● The capacity to design and/or create new digital artefacts and materials such as digital writing, digital imaging, digital audio and video, digital code, apps and interfaces, web pages. [xxv] An understanding of the digital production process and the basics of editing and coding. [xxvi]		
Digital Research and Problem Solving	● The capacity to: use digital evidence to solve problems and answer questions.	● The capacity to: use digital evidence to solve problems and answer questions; collect and collate new evidence; evaluate the quality and value of evidence, and to share evidence and findings using digital methods. [xxvii] ● An understanding of digital research methods and of different data analysis tools and techniques. [xxviii]		

Digital Innovation	● The capacity to adopt and develop new practices with digital technology in different settings.	● The capacity to adopt and develop new practices with digital technology in different settings (personal and organisational, social and work-based). The capacity to use digital technologies in developing new ideas, projects and opportunities. [xxix] An understanding of innovation, enterprise and project management in digital settings. [xxx]		
Digital Communication	● The capacity to communicate effectively in digital media.	● The capacity to: communicate effectively in digital media and spaces such as text-based forums, online video, audio and social media; design digital communications for different purposes and audiences; respect others in public communications; maintain privacy in private communications; identify and deal with false or damaging digital communications. [xxxi] ● An understanding of the features of different digital media for communication		

		and of the varieties of communication norms and needs. [xxxii]		
Digital Collaboration	● To participate in digital teams and working group.	● The capacity to: participate in digital teams and working groups; collaborate effectively using shared digital tools and media; produce shared materials; use shared productivity tools; work effectively across cultural, social and linguistic boundaries. [xxxiii] ● An understanding of the features of different digital tools for collaboration, and of the varieties of cultural and other norms for working together. [xxxiv]		
Digital Participation[xxxv]	● The capacity to participate in, facilitate and build digital networks.	● The capacity to: participate in, facilitate and build digital networks; participate in social and cultural life using digital media and services; create positive connections and build contacts; share and amplify messages across networks; behave safely and ethically in networked environments. [xxxvi]		

		● An understanding of how digital media and networks influence social behaviour. [xxxvii]		
Digital Learning[xxxviii]	● The capacity to: participate in (and benefit from) digital learning opportunities.	● The capacity to: participate in (and benefit from) digital learning opportunities; identify and use digital learning resources; participate in learning dialogues via digital media; use learning apps and services (personal or organisational); use digital tools to organise, plan and reflect on learning; record learning events/data and use them for self-analysis, reflection and showcasing of achievement; monitor own progress; participate in digital assessment and receive digital feedback; manage own time and tasks, attention and motivation to learn in digital settings[xxxix] An understanding of the opportunities and challenges involved in learning online – and of own needs and preferences as a digital learner (eg access, media, platform and pedagogy) [xl]		

Digital Teaching	● The capacity to support and develop others in digitally-rich settings.	● The capacity to support and develop others in digitally-rich settings to teach, to work in a teaching or curriculum team, to design learning opportunities, to support and facilitate learning; be proactive in peer learning – all while making effective use of the available digital tools and resources[xli] An understanding of the educational value of different media for teaching, learning and assessment, and of different educational approaches and their application in digitally-rich settings[xlii]		
Digital Identify Management[xliii]	● The capacity to: develop and project a positive digital identity or identities.	● The capacity to: develop and project a positive digital identity or identities and to manage digital reputation (personal or organisational) across a range of platforms; build and maintain digital profiles and other identity assets such as records of achievement; review the impact of online activity; collate and		

		curate personal materials across digital networks[xliv] ● An understanding of the reputational benefits and risks involved in digital participation[xlv]		
Digital Wellbeing (Self-actualising) [xlvi]	● Looking after personal health, safety, relationships and work-life balance in digital settings.	● Looking after personal health, safety, relationships and work-life balance in digital settings; use digital tools in pursuit of personal goals (e.g. health and fitness) and to participate in social and community activities; act safely and responsibly in digital environments; negotiate and resolve conflict; manage digital workload, overload and distraction; act with concern for the human and natural environment when using digital tools [xlvii] ● An understanding of the benefits and risks of digital participation in relation to health and wellbeing outcomes[xlviii]		
Strategic planning	The creation, iteration and maintenance of a digital strategy.	● The creation, iteration and maintenance of a strategy in order to align		

		organisational actions, plans and resources with business objectives and the development of plans to drive forward and execute that strategy. ● Working with stakeholders to communicate and embed strategic management via objectives, accountabilities and monitoring of progress.[xlix]		
Innovation	The capability to identify, prioritise, incubate and exploit opportunities provided by information, communication and digital technologies	● The capability to identify, prioritise, incubate and exploit opportunities provided by information, communication and digital technologies. ● To develop and implement processes, tools and infrastructures to support innovation. ● To involve internal and external communities, employees, commercial partners, customers, users and other		

		stakeholders in the innovation process. ● To provide governance, monitoring to, and reporting on, the innovation process. .[l]		
Emerging technology and monitoring	The identification of new and emerging technologies, products, services, methods and techniques	● The identification of new and emerging technologies, products, services, methods and techniques. The assessment of their relevance and the potential impacts (both threats and opportunities) upon business enablers, cost, performance or sustainability. [li] ● The communication of emerging technologies and their impact[lii]		
User research	The identification of users' behaviours, needs and motivations	● The identification of users' behaviours, needs and motivations through ethnography, observation techniques, task analysis, and other methodologies that incorporate both the social and technological context. Taking an approach that incorporates significant involvement of users in research to generate deep		

		understanding and uncover new opportunities for systems, products and services. [liii] ● The quantification of different user populations and their needs, identifying target users and segments in order to maximise the chances of design success for systems, products and services. [liv] ● The inclusion of a range of users in research activities to capture the diversity of users of the organisation's systems, products and services and the imperative to make these usable and accessible for everyone. [lv]		
User experience design	The process of iterative design to enhance user satisfaction	● The process of iterative design to enhance user satisfaction by improving the usability and accessibility provided when interacting with a system, product or service. ● The design of users' digital and offline tasks, interactions and interfaces to meet usability and accessibility requirements. ● The refinement of designs in response to user-centred evaluation and feedback and communication of the design to those responsible for design, development and implementation. [lvi]		

Business improvement processes	The creation of new and potentially disruptive approaches to performing business activities in order to create business opportunities.	● The creation of new and potentially disruptive approaches to performing business activities in order to create business opportunities; deliver new or improved products/services; or to improve supply chains. ● The identification and implementation of improvements to business operations, services and models. ● The assessment of the costs and potential benefits of the new approaches. ● The analysis and design of business processes in order to adopt and exploit technologies to improve business performance. ● The development of enterprise process management capabilities to increase organisational agility and responsiveness to change. . [lvii]		
Demand management	The analysis and proactive management of business demand for new services or modifications to existing service features or volumes. [lviii]	● Collaborating with the business to prioritise demand in order to improve business value. ● Developing and communicating insights into patterns of demand.		

		● Proposing responses to meet both short-term and long-term demand and facilitating decision making and planning. ● Integrating demand analysis and planning with complementary strategic, operational and change planning processes. . [lix]		
Portfolio management	The development and application of a systematic management framework to define and deliver a portfolio of programmes, projects and/or ongoing services, in support of specific business strategies and objectives. [lx]	● Includes the implementation of a strategic investment appraisal and decision making process based on a clear understanding of cost, risk, inter-dependencies, and impact on existing business activities, enabling measurement and objective evaluation of potential changes and the benefits to be realised. ● The prioritisation of resource utilisation and changes to be implemented. The regular review of portfolios. ● The management of the service pipeline (proposed or in development), service catalogue (live or available for deployment) and retired services.[lxi]		

Enterprise and business architecture	The creation, iteration, and maintenance of structures such as enterprise and business architectures embodying the key principles, methods and models that describe the organisation's future state, and that enable its evolution. [lxii]	This typically involves the interpretation of business goals and drivers; the translation of business strategy and objectives into an "operating model"; the strategic assessment of current capabilities; the identification of required changes in capabilities; and the description of inter-relationships between people, organisation, service, process, data, information, technology and the external environment. . [lxiii] The architecture development process supports the formation of the constraints, standards and guiding principles necessary to define, assure and govern the required evolution; this facilitates change in the organisation's structure, business processes, systems and infrastructure in order to achieve predictable transition to the intended state. [lxiv]		
Product management	● The active management of products or services throughout their lifecycle (inception through to retirement) in order to address market opportunities and customer/user needs and generate the greatest possible value for the business. [lxv]	● The adoption and adaptation of product development models based on the context of the work and selecting appropriately from predictive (plan-driven) approaches or adaptive (iterative/agile) approaches. [lxvi]	Web Development engineer	

Marketing	The research, analysis and stimulation of potential or existing markets for IT and related products and services, both to provide a sound basis for business development and to generate a satisfactory flow of customer enquiries. [lxvii]	The management and development of strategies, campaigns and day-to-day marketing activity delivered through appropriate channels[lxviii]		
Strategic planning	The creation, iteration and maintenance of a strategy	● The creation, iteration and maintenance of a strategy in order to align organisational actions, plans and resources with business objectives and the development of plans to drive forward and execute that strategy. [lxix] ● Working with stakeholders to communicate and embed strategic management via objectives, accountabilities and monitoring of progress[lxx].		
Innovation	The capability to identify, prioritise, incubate and exploit opportunities. [lxxi]	● The capability to identify, prioritise, incubate and exploit opportunities provided by information, communication and digital technologies. [lxxii]		

		● To develop and implement processes, tools and infrastructures to support innovation. To involve internal and external communities, employees, commercial partners, customers, users and other stakeholders in the innovation process. [lxxiii] ● To provide governance, monitoring to, and reporting on, the innovation process. [lxxiv]		
Emerging technology monitoring	The identification of new and emerging technologies, products, services, methods and techniques. [lxxv]	● The identification of new and emerging technologies, products, services, methods and techniques. ● The assessment of their relevance and the potential impacts (both threats and opportunities) upon business enablers, cost, performance or sustainability. ● The communication of emerging technologies and their impact. [lxxvi]		
User research	The identification of users' behaviours, needs and motivations	● The identification of users' behaviours, needs and motivations through ethnography, observation techniques,		

		task analysis, and other methodologies that incorporate both the social and technological context. Taking an approach that incorporates significant involvement of users in research to generate deep understanding and uncover new opportunities for systems, products and services. ● The quantification of different user populations and their needs, identifying target users and segments in order to maximise the chances of design success for systems, products and services. ● The inclusion of a range of users in research activities to capture the diversity of users of the organisation's systems, products and services and the imperative to make these usable and accessible for everyone. [lxxvii]		
User experience design	The process of iterative design to enhance user satisfaction	● The process of iterative design to enhance user satisfaction by improving the usability and accessibility provided when interacting with a system, product or service.		

		● The design of users' digital and offline tasks, interactions and interfaces to meet usability and accessibility requirements. ● The refinement of designs in response to user-centred evaluation and feedback and communication of the design to those responsible for design, development and implementation. [lxxviii]		
Business process improvement	The creation of new and potentially disruptive approaches to performing business activities	● The creation of new and potentially disruptive approaches to performing business activities in order to create business opportunities; deliver new or improved products/services; or to improve supply chains. ● The identification and implementation of improvements to business operations, services and models. The assessment of the costs and potential benefits of the new approaches. ● The analysis and design of business processes in order to adopt and exploit		

		technologies to improve business performance. ● The development of enterprise process management capabilities to increase organisational agility and responsiveness to change. [lxxix]		
Demand Management	The analysis and proactive management of business demand for new services or modifications to existing service features or volumes [lxxx]	● The analysis and proactive management of business demand for new services or modifications to existing service features or volumes. ● Collaborating with the business to prioritise demand in order to improve business value. ● Developing and communicating insights into patterns of demand. ● Proposing responses to meet both short-term and long-term demand and facilitating decision making and planning. Integrating demand analysis and planning with complementary strategic,		

		operational and change planning processes. [lxxxi]		
Portfolio management	The development and application of a systematic management framework to define and deliver a portfolio of programmes, projects and/or ongoing services[lxxxii]	● The development and application of a systematic management framework to define and deliver a portfolio of programmes, projects and/or ongoing services, in support of specific business strategies and objectives. ● Includes the implementation of a strategic investment appraisal and decision making process based on a clear understanding of cost, risk, inter-dependencies, and impact on existing business activities, enabling measurement and objective evaluation of potential changes and the benefits to be realised. ● The prioritisation of resource utilisation and changes to be implemented. The regular review of portfolios. ● The management of the service pipeline (proposed or in development), service		

		catalogue (live or available for deployment) and retired services. [lxxxiii]		
Organisational capability development	The provision of leadership, advice and implementation support to assess organisational capabilities and to identify, prioritise and implement improvements.	● The provision of leadership, advice and implementation support to assess organisational capabilities and to identify, prioritise and implement improvements. ● The selection, adoption and integration of appropriate industry frameworks and models to guide improvements. ● The systematic use of capability maturity assessments, metrics, process definition, process management, repeatability and the introduction of appropriate techniques, tools and enhanced skills. ● The delivery of an integrated people, process and technology solution to deliver improved organisational performance in line with organisation's strategic plans and objectives. ● The scope of improvement is organisational but may also be highly		

		focussed as necessary for example software development, systems development, project delivery or service improvement. [lxxxiv]		
Sourcing	The provision of policy, internal standards and advice on the procurement or commissioning of externally supplied and internally developed products and services [lxxxv]	● The provision of policy, internal standards and advice on the procurement or commissioning of externally supplied and internally developed products and services. ● The provision of commercial governance, conformance to legislation and assurance of information security. ● The implementation of compliant procurement processes, taking full account of the issues and imperatives of both the commissioning and supplier sides. ● The identification and management of suppliers to ensure successful delivery		

		of products and services required by the business. [lxxxvi]		
Organisation design and implementation	The planning, design and implementation of an integrated organisation structure and culture. [lxxxvii]	● The planning, design and implementation of an integrated organisation structure and culture including the workplace environment, locations, role profiles, performance measurements, competencies and skills. ● The facilitation of changes needed to adapt to changes in technologies, society, new operating models and business processes. ● The identification of key attributes of the required culture and how these can be implemented and reinforced to bring about improved organisational performance. [lxxxviii]		
Competency Assessment	The assessment of knowledge, skills and behaviours	● The assessment of knowledge, skills and behaviours by any means		

		whether formal or informal against frameworks such as SFIA. ● The evaluation, selection, adoption and adaptation of assessment methods, tools, and techniques based on the context of the assessment and how the results of the assessment are to be used. ● The evaluation of learning or educational activities against defined skills/competency development outcomes. [lxxxix]		
Learning design and development	The specification, design, creation, packaging and maintenance of materials and resources for use in learning and development[xc]	● The specification, design, creation, packaging and maintenance of materials and resources for use in learning and development in the workplace or in compulsory, further or higher education. ● Typically involves the assimilation of information from existing sources, selection and re-presentation in a		

		form suitable to the intended purpose and audience. ● Includes instructional design, content development, configuration and testing of learning environments, and use of appropriate current technologies such as audio, video, simulation and assessment. May include third party accreditation. [xci]		
Knowledge management	The systematic management of vital knowledge to create value for the organisation. [xcii]	● The systematic management of vital knowledge to create value for the organisation by capturing, sharing, developing and exploiting the collective knowledge of the organisation to improve performance, support decision making and mitigate risks. ● The development of a supportive and collaborative knowledge sharing culture to drive the successful adoption of technology solutions for knowledge management.		

		● Providing access to informal, tacit knowledge as well as formal, documented, explicit knowledge by facilitating internal and external collaboration and communications. [xciii]		
Change implementation planning and management	The definition and management of the process for deploying and integrating new digital capabilities into the business[xciv]	● The definition and management of the process for deploying and integrating new digital capabilities into the business in a way that is sensitive to and fully compatible with business operations.		
Performance management	The optimisation of performance of people. [xcv]	● The optimisation of performance of people, including determination of capabilities, integration into teams, allocation of tasks, direction, support, guidance, motivation, and management of performance. [xcvi]		
Resourcing	The overall resource management of the workforc	● The overall resource management of the workforce to enable effective operation of the organisation. Provision of advice on any aspect of acquiring resources,		

		including employees, consultants and contractors. [xcvii]		
Professional development	The facilitation of the professional development of individuals. [xcviii]	● The facilitation of the professional development of individuals, including initiation, monitoring, review and validation of learning and development plans in line with organisational or business requirements. ● The counselling of participants in all relevant aspects of their continual professional development. ● The identification of appropriate learning/development resources. Liaison with internal and external training providers. ● The evaluation of the benefits of continual professional development activities.		
Enterprise IT governance	The establishment and oversight of an organisation's approach to the use of Information systems and digital services, and associated technology, in	● The establishment and oversight of an organisation's approach to the use of Information systems and digital services, and associated technology, in line with the		

	line with the needs of the principal stakeholders of the organisation and overall organisational corporate governance requirements.[xcix]	needs of the principal stakeholders of the organisation and overall organisational corporate governance requirements. ● The determination and accountability for evaluation of current and future needs; directing the planning for both supply and demand of these services; the quality, characteristics, and level of IT services; and for monitoring the conformance to obligations (including regulatory, legislation, control, and other standards) to ensure positive contribution of IT to the organisation's goals and objectives. [c]		
Information governance	The overall governance of how all types of information are used to support decision-making, business processes and digital services.. [ci]	● The overall governance of how all types of information, structured and unstructured, whether produced internally or externally, are used to support decision-making, business processes and digital services. ● Encompasses development and promotion of the strategy and policies		

		covering the design of information structures and taxonomies, the setting of policies for the sourcing and maintenance of the data content, and the development of policies, procedures, working practices and training to promote compliance with legislation regulating all aspects of holding, use and disclosure of data. [cii]		
Information security	The, implementation and operation of controls and management strategies and compliance of information systems with legislation, regulation and relevant standards. [ciii]	● The selection, design, justification, implementation and operation of controls and management strategies to maintain the security, confidentiality, integrity, availability, accountability and relevant compliance of information systems with legislation, regulation and relevant standards. [civ]		
Information assurance	The protection of data in storage and in transit, and management in a pragmatic and cost effective manner to ensure stakeholder confidence. [cv]	● The protection of integrity, availability, authenticity, non-repudiation and confidentiality of information and data in storage and in transit.		

		● The management of risk in a pragmatic and cost effective manner to ensure stakeholder confidence. [cvi]		
Financial management	The overall financial management, control and stewardship of the IT assets[cvii]	● The overall financial management, control and stewardship of the IT assets and resources used in the provision of IT services, including the identification of materials and energy costs, ensuring compliance with all governance, legal and regulatory requirements. [cviii]		
Data management	The management of practices and processes to ensure the security, quality, integrity, safety and availability of all forms of data	● The management of practices and processes to ensure the security, quality, integrity, safety and availability of all forms of data and data structures that make up the organisation's information. ● The management of data and information in all its forms and the analysis of information structure (including logical analysis of taxonomies, data and metadata). The development of		

		innovative ways of managing the information assets of the organisation. [cix]		
Programme management	The identification, planning and coordination of a set of related projects within a programme of business change, to manage their interdependencies in support of specific business strategies and objectives.[cx]	● The identification, planning and coordination of a set of related projects within a programme of business change, to manage their interdependencies in support of specific business strategies and objectives. ● The maintenance of a strategic view over the set of projects, providing the framework for implementing business initiatives, or large-scale change, by conceiving, maintaining and communicating a vision of the outcome of the programme and associated benefits. (The vision, and the means of achieving it, may change as the programme progresses). ● Agreement of business requirements, and translation of requirements into		

		operational plans. Determination, monitoring, and review of programme scope, costs, and schedule, programme resources, inter-dependencies and programme risk. [cxi]		
Project management	The management of projects. [cxii]	● The management of projects, typically (but not exclusively) involving the development and implementation of business processes to meet identified business needs, acquiring and utilising the necessary resources and skills, within agreed parameters of cost, timescales, and quality. ● The adoption and adaptation of project management methodologies based on the context of the project and selecting appropriately from predictive (plan-driven) approaches or adaptive (iterative/agile) approaches. [cxiii]		

Portfolio management	The provision of support and guidance on portfolio, programme and project management processes, procedures, tools and techniques.[cxiv]	● The provision of support and guidance on portfolio, programme and project management processes, procedures, tools and techniques. ● Support includes definition of portfolios, programmes, and projects; advice on the development, production and maintenance of business cases; time, resource, cost and exception plans, and the use of related software tools. ● Tracking and reporting of programme/project progress and performance are also covered, as is the capability to facilitate all aspects of portfolio/ programme/ project meetings, workshops and documentation. [cxv]		
Systems development management	The planning, estimating and execution of programmes of systems development work to time, budget and quality targets. [cxvi]	● The identification of the resources needed for systems development and how this will be met with an effective supply capacity. [cxvii]		

		● The alignment of systems development activity and deliverables with agreed architectures and standards. [cxviii] ● The development of roadmaps to communicate future systems development plans. [cxix] ● The adoption and adaptation of systems development lifecycle models based on the context of the work and selecting appropriately from predictive (plan-driven) approaches or adaptive (iterative/agile) approaches. [cxx]		
Benefits management	Establishing an approach for forecasting, planning and monitoring the emergence and effective realisation of anticipated benefits[cxxi]	● Establishing an approach for forecasting, planning and monitoring the emergence and effective realisation of anticipated benefits. Identifying and implementing the actions needed to optimise the business impact of individual and		

		combined benefits. The confirmation of the achievement of expected benefits. [cxxii]		
Relationship management	The systematic identification, analysis, management, monitoring and improvement of stakeholder relationships[cxxiii]	● The systematic identification, analysis, management, monitoring and improvement of stakeholder relationships in order to target and improve mutually beneficial outcomes. ● Gains commitment to action through consultation and consideration of impacts. ● Design the relationship management approach to be taken; including roles and responsibilities, governance, policies, processes, and tools, and support mechanisms.[cxxiv]		
Business modelling	The production of representations of real world, business or gaming situations in traditional or trans-media applications, to aid the communication	● The production of abstract or distilled representations of real world, business or gaming situations in traditional or trans-media applications, to aid the		

	and understanding of existing, conceptual or proposed scenarios.[cxxv]	communication and understanding of existing, conceptual or proposed scenarios. ● Predominantly focused around the representation of processes, roles, data, organisation and time. ● Models may be used to represent a subject at varying levels of detail and decomposition. [cxxvi]		
Requirements definition and management	The elicitation, analysis, specification and validation of requirements and constraints to a level that enables effective development and operations of new or changed software, systems, processes, products and services.. [cxxvii]	● The elicitation, analysis, specification and validation of requirements and constraints to a level that enables effective development and operations of new or changed software, systems, processes, products and services. ● The management of requirements throughout the whole of the delivery and operational life cycle of the software, system, processes, products or services. The negotiation of trade-offs that are both acceptable to key		

		stakeholders and within budgetary, technical, regulatory, and other constraints. ● The adoption and adaptation of requirements management lifecycle models based on the context of the work and selecting appropriately from plan-driven/predictive approaches or more adaptive (iterative and agile) approaches. [cxxviii]		
User experience analysis	The identification, analysis, clarification and communication of the context of use in which applications will operate, and of the goals of products, systems or services.[cxxix]	● The identification, analysis, clarification and communication of the context of use in which applications will operate, and of the goals of products, systems or services. ● Analysis and prioritisation of stakeholders' user experience needs and definition of required system, product or service attributes, behaviour and performance. The definition and management of user experience and user accessibility requirements for all potential users. [cxxx]		

User experience design	The process of iterative design to enhance user satisfaction	● The process of iterative design to enhance user satisfaction by improving the usability and accessibility provided when interacting with a system, product or service. ● The design of users' digital and offline tasks, interactions and interfaces to meet usability and accessibility requirements. ● The refinement of designs in response to user-centred evaluation and feedback and communication of the design to those responsible for design, development, and implementation. [cxxxi]		
Analytics	The application of mathematics, statistics, predictive modeling and machine-learning techniques to discover meaningful patterns and knowledge in recorded data.[cxxxii]	● The application of mathematics, statistics, predictive modeling and machine-learning techniques to discover meaningful patterns and knowledge in recorded data. ● Analysis of data with high volumes, velocities and variety (numbers, symbols, text, sound and image).		

		● Development of forward-looking, predictive, real-time, model-based insights to create value and drive effective decision-making. ● The identification, validation and exploitation of internal and external data sets generated from a diverse range of processes. [cxxxiii]		
Data visualisation	The process of interpreting concepts, ideas, and facts by using graphical representations.[cxxxiv]	● The process of interpreting concepts, ideas, and facts by using graphical representations. ● Condensing and encapsulating the characteristics of data, making it easier to surface opportunities, identify risks, analyse ● trends, to drive effective decision-making. Presenting findings and data insights in creative ways to facilitate the understanding of data across a range of technical and non-technical audiences. [cxxxv]		

Methods and tools	Methods and tools to support planning, development, testing, operation, management and maintenance of systems.[cxxxvi]	● The definition, tailoring, implementation, assessment, measurement, automation and improvement of methods and tools to support planning, development, testing, operation, management and maintenance of systems. ● Ensuring methods and tools are adopted and used effectively throughout the organisation. [cxxxvii]		
Solution architecture	The design and communication of high-level structures to enable and guide the design and development of integrated solutions that meet current and future business needs. [cxxxviii]	● The design and communication of high-level structures to enable and guide the design and development of integrated solutions that meet current and future business needs. ● In addition to technology components, solution architecture encompasses changes to service, process, organisation, and operating models. ● The provision of comprehensive guidance on the development of, and modifications to, solution components to ensure that		

		they take account of relevant architectures, strategies, policies, standards and practices (including security) and that existing and planned solution components remain compatible. [cxxxix]		
Business analysis	The methodical investigation, analysis, review and documentation of all or part of a business in terms of business goals, objectives, functions and processes, the information used and the data on which the information is based.. [cxl]	● The methodical investigation, analysis, review and documentation of all or part of a business in terms of business goals, objectives, functions and processes, the information used and the data on which the information is based. ● The definition of requirements for improving processes and systems, reducing their costs, enhancing their sustainability, and the quantification of potential business benefits. ● The collaborative creation and iteration of viable specifications and acceptance criteria in preparation for the deployment		

		of information and communication systems. ● The adoption and adaptation of business analysis approaches based on the context of the work and selecting appropriately from predictive (plan-driven) approaches or adaptive (iterative/agile) approaches. [cxli]		
Systems design	The design of systems to meet specified requirements, compatible with agreed systems architectures, adhering to corporate standards and within constraints of performance and feasibility.[cxlii]	● The design of systems to meet specified requirements, compatible with agreed systems architectures, adhering to corporate standards and within constraints of performance and feasibility. ● The identification of concepts and their translation into a design which forms the basis for systems construction and verification. The design or selection of components. ● The development of a complete set of detailed models, properties, and/or characteristics described in a form suitable for implementation		

		● . The adoption and adaptation of systems design lifecycle models based on the context of the work and selecting appropriately from predictive (plan-driven) approaches or adaptive (iterative/agile) approaches. [cxliii]		
Customer service support	The management and operation of one or more customer service or service desk functions. [cxliv]	● The management and operation of one or more customer service or service desk functions. ● Acting as a point of contact to support service users and customers reporting issues, requesting information, access, or other services. ● The delivery of customer service through multiple channels including human, digital, self-service and automated. [cxlv]		
Supplier management	The alignment of an organisation's supplier performance objectives and activities with sourcing strategies and plans, balancing costs, efficiencies and service quality.[cxlvi]	● The alignment of an organisation's supplier performance objectives and activities with sourcing strategies and plans, balancing costs, efficiencies and service quality.		

		● The establishment of working relationships based on collaboration, trust, and open communication in order to encourage co-innovation and service improvement with suppliers. The proactive engagement of suppliers for mutual benefit to resolve operational incidents, problems, poor performance and other sources of conflict. ● The use of clear escalation paths for discussing and resolving issues. The management of performance and risks across multiple suppliers (internal and external) using a set of agreed metrics. [cxlvii]		
User experience evaluation	Assuring that the stakeholder and organisational requirements have been met[cxlviii]	● Validation of systems, products or services, to assure that the stakeholder and organisational requirements have been met, required practice has been followed, and systems in use continue to meet organisational and user needs. Iterative assessment (from early		

		prototypes to final live implementation) of effectiveness, efficiency, user satisfaction, health and safety, and accessibility to measure or improve the usability of new or existing processes, with the intention of achieving optimum levels of product or service usability. [cxlix]		
Cross Agency Collaboration	Facilitation of cross agency and cross-sector collaboration[cl]	● Tools and platforms that optimise effectiveness by facilitating cross agency and cross-sector collaboration[cli]		
Digital enterprise	Cross agency data sharing and catalyse the local digital economy[clii]	● A new generation of digital capabilities to support cross agency data sharing and catalyse the local digital economy[cliii]		
Digital citizen	Placing citizens at the centre of their service design strategy[cliv]	● Redesign of city government's interface with its citizens, placing them at the centre of their service design strategy[clv]		
Strategy and planning	Strategy-and planning to map-out transformational opportunities[clvi]	● Strategy-led, value-centred long term planning to map-out transformational opportunities[clvii]		

Performance management	Outcome-based performance management g[clviii]	● Outcome-based performance management to enable more informed decision making[clix]		
Asset management	Management of assets e[clx]	● Comprehensive management of assets and fleet to drive capital and operating efficiencies and resilience[clxi]		
Back office	Best practice business processes and best of breed architecture[clxii]	● Establishment of a system of record supported through global best practice, business processes and best of breed architecture[clxiii]		

4.2 Data

Types of capabilities	Description	Skills required	Job roles to deliver these capabilities	What this enables the organisation to do
Understand how data is used and shared	Effective data sharing and use.	● In-depth understanding of available data, and how data is accessed shared and used. [clxiv] ● Mapping data ecosystems, identify learning needs and operationalise data ethics[clxv]	● Product Managers[clxvi]	
Data governance	Compliance with legal, ethical and contractual obligations[clxvii]	● Compliance with legal, ethical and contractual obligations[clxviii]	Data Protection Officers[clxix]	
Valuing data as an asset	Data is treated like an asset.	● Building a culture where data is treated like an asset. ● An understanding of how data flows through the business. [clxx]	Data Governance Lead[clxxi]	

Data skills development	A balanced data skills programme that recognises the need for people in roles across an organisation to develop new competencies and skills. [clxxii]	● A balanced data skills programme that recognises the need for people in roles across an organisation to develop new competencies and skills. [clxxiii] ● A balanced data skills programme of training.[clxxiv]	Learning and Development Leads[clxxv]	
Data strategy delivery	Data strategy delivers value for a business through data-enabled innovation. [clxxvi]	● Data strategy delivers value for a business through data-enabled innovation. [clxxvii] ● Understand the business opportunity ● Work with data engineers and the IT department to find the right data sources ● Prepare data and build ML and specialized AI models ● Assist in the deployment of models into the operations of the organization ● Measure success and communicate that back to the business	C-Suite Leaders (Chief Data Officers, Chief Technology Officers, Chief Information Officers etc) [clxxviii]	
Data science	Data science skills of statistics, computer science and domain expertise.	Three core competencies: 1) Statistics: to model and summarize data sets		

		2) Computer science, to design and use algorithms to store, process and visualize data 3) Domain expertise, necessary to formulate the right questions and to put the answers in context.		
Sampling and probability	Understand sampling, probability theory, and probability distributions[clxxix]	● Understand and apply different sampling techniques and ways to avoid bias[clxxx] ● Understand the concepts of probability, conditional probability, and the Bayes' theorem[clxxxi] ● Demonstrate knowledge of distributions such as the normal distribution and binomial distribution[clxxxii]		
Descriptive statistics	Demonstrate knowledge of descriptive statistical concepts[clxxxiii]	● Identify definitions of central tendency and dispersion (mean, median, mode, standard deviations) 2Demonstrate knowledge about working with categorical data vs. numerical data[clxxxiv]		

		• Recognize the difference between descriptive and inferential statistics[clxxxv]		
Inferential statistics	Demonstrate knowledge of inferential statistics[clxxxvi]	• Demonstrate understanding of the central limit theory and confidence intervals[clxxxvii] • Demonstrate the ability to develop and test hypothesis[clxxxviii] • Understand inference for comparing means (ANOVA) [clxxxix] • Understand inference for comparing proportions[cxc] • Articulate, and demonstrate knowledge of correlation and regression[cxci] • Understand how to test and validate assumptions for regression models[cxcii] • Understand the impact of multicollinearity in regression[cxciii] • Use a regression model to predict numeric values[cxciv]		
Python programming skills	Demonstrate knowledge of Python programming skills[cxcv]	• Demonstrate the ability to build Python code using variables, relational operators, logical operators, loops, and functions[cxcvi]		

		● Read and write data from csv and json files ● Use data structures such as lists, tuples, sets, and dictionaries [cxcvii] ● Demonstrate knowledge of NumPy and SciPy libraries [cxcviii] ● Learn to use Git repositories [cxcix] ● Demonstrate knowledge of Anaconda, and Jupyter notebooks[cc]		
Implement descriptive and inferential statistics using Python	Implement descriptive and inferential statistics using Python[cci]	● Understand use of histograms and box plots to understand and visualize data distributions [ccii] ● Master descriptive statistics Python code calculating mean, median, mode, standard deviation, and percentiles; and identifying outliers [cciii] ● Use Python code to test hypothesis, calculate correlations and to predict a continuous variable using regression [cciv] ● Validate regression assumptions[ccv]		

Visualize data and extract insights	Demonstrate ability to visualize data and extract insights[ccvi]	● Demonstrate expertise with Python visualization libraries [ccvii] ● Demonstrate ability to visualize data for statistical analysis: histograms, box plots [ccviii] ● Demonstrate ability to visualize data for insight sharing with nontechnical users[ccix]		
Analyse a dataset and communicate insights	Demonstrate through a project the ability to analyse a dataset and communicate insights[ccx]	● Demonstrate the ability to complete a project using all skills acquired up to this point: data exploration, descriptive and inferential statistics, and data visualizations[ccxi] ● Build a report with findings[ccxii] ● Deliver a presentation sharing insights[ccxiii] ● Demonstrate solid communication skills (written and verbal) [ccxiv]		
Data science	Demonstrate understanding of what data science and what data scientists is do[ccxv]	● Articulate what are the benefits of using data science [ccxvi] ● Articulate what a data scientist does and the value of data scientists to an organization[ccxvii]		

		● Understand some of the tools and the technology behind data science (IBM DSX and others) [ccxviii] ● Articulate the value of data science in specific use cases[ccxix]		
Characterize a business problem	Demonstrate ability to characterize a business problem[ccxx]	● Leverage business acumen to understand how to take a business problem and put it into quantifiable form[ccxxi] ● Collaborate with cross-functional stakeholders to identify quantifiable improvements[ccxxii] ● Define key business indicators and target improvement metrics[ccxxiii]		
Formulate a business problem as a hypothesis question	Demonstrate ability to formulate a business problem as a hypothesis question[ccxxiv]	● Formulate business problem as a research question with associated hypotheses[ccxxv] ● Determine what data is needed to test the hypotheses[ccxxvi] ● Ensure hypotheses to be tested are aligned with business value[ccxxvii]		
Methodologies in the execution of	Demonstrate use of methodologies in the execution of the analytics cycle[ccxxviii]	● Demonstrate how to apply the scientific method to business problems[ccxxix]		

the analytics cycle		● Demonstrate how to apply the CRISP-DM methodology[ccxxx] ● Demonstrate understanding of an experimentation approach to insight finding and solution building[ccxxxi]		
Project planning	Demonstrate through a project the ability to plan for the execution of a project[ccxxxii]	● Demonstrate the ability to setup a new project and follow the application of the scientific method and the CRISP-DM methodology[ccxxxiii] ● Build a report explaining the project plan[ccxxxiv] ● Deliver a presentation sharing the project plan[ccxxxv] ● Demonstrate solid communication skills (written and verbal) [ccxxxvi]		
Identify and collect data – multiple formats	Demonstrate ability to identify and collect data – multiple formats[ccxxxvii]	● Demonstrate SQL skills for querying databases and joining tables[ccxxxviii] ● Demonstrate ability to work with data from multiple data sources: SQL Data bases, NoSQL Databases [ccxxxix]		

		● Demonstrate ability to work with data in databases, csv and json files[ccxl]		
Manipulate, transform, and clean data	Demonstrate ability to manipulate, transform, and clean data[ccxli]	● Demonstrate an understanding of when/why data transformations are necessary [ccxlii] ● Apply feature selection techniques[ccxliii] ● Demonstrate understanding of techniques to clean data [ccxliv] ● Demonstrate mastery of the pandas library for data transformation and manipulation [ccxlv] ● Demonstrate expertise with slicing, indexing, sub-setting, and merging and joining datasets[ccxlvi]		
Deal with missing values, outliers, unbalanced data, as well as data normalization	Demonstrate expertise with techniques to deal with missing values, outliers, unbalanced data, as well as data normalization[ccxlvii]	● Able to identify in which situations data may need to be scaled [ccxlviii] ● Able to select the best way to handle missing values [ccxlix] ● Able to identify outliers and understand options to handle outliers [ccl]		

		● Able to understand the impact of working with unbalanced data [ccli] ● Able to construct a fully usable dataset		
Construct usable data sets	Demonstrate through a project the ability to construct usable data sets[cclii]	● Demonstrate the ability to complete a data engineering project using all skills acquired up to this point: cleaning and transforming data and building a usable dataset[ccliii] ● Build a report documenting decisions made on the data ● Deliver a presentation sharing process and results[ccliv] ● Demonstrate solid communication skills (written and verbal) [cclv]		
Understanding of linear algebra principles for machine learning	Demonstrate understanding of linear algebra principles for machine learning[cclvi]	● Demonstrate understanding of working with vectors[cclvii] ● Demonstrate understanding of working with matrices[cclviii] ● Understand the application of eigenvectors and eigenvalues[cclix]		

Modelling techniques	Demonstrate understanding of different modelling techniques[cclx]	● Learn how to build models using libraries such as scikit-learn, and algorithms such as regressions, logistic regressions, decision trees, boosting, random forest, Support Vector Machines, association rules, classification, clustering, neural networks, time series, survival analysis, etc. [cclxi] ● Understand the process for experimentation and testing of different models on a dataset [cclxii] ● Demonstrate expertise selecting potential models to test, based on the available data, data distributions, and the goal of the project: explaining relationships or prediction [cclxiii] ● Apply feature selection techniques [cclxiv] ● Demonstrate use of principal component analysis[cclxv]		

Model validation and selection techniques	Demonstrate understanding of model validation and selection techniques[cclxvi]	• Demonstrate successful application of model validation and selection methods[cclxvii] • Demonstrate use of cross-validation [cclxviii] • Demonstrate use of model accuracy metrics such as Confusion Matrix, Gain and Lift Chart, Kolmogorov Smirnov Chart, AUC – ROC, Gini Coefficient, Concordant – Discordant Ratio, and Root Mean Squared Error[cclxix]		
Communicate results translating insight into business value	Communicate results translating insight into business value[cclxx]	• Demonstrate the ability to turn data insight into business value [cclxxi] • Demonstrate the ability to adapt final deliverables and presentations based on the audience: data scientists, or business stakeholders[cclxxii]		
Test different models on a dataset, validate and select the best model, and	Demonstrate through a project the ability to test different models on a dataset, validate and select the best model, and communicate results[cclxxiii]	• Demonstrate the ability to complete a project using all skills acquired up to this point: defining a business challenge as a hypothesis, selecting and evaluating		

communicate results		different models on a date set and selecting a final "best" model[cclxxiv] ● Build a report with findings and conclusions for a data science audience and for a business audience[cclxxv] ● Deliver a presentation sharing results for a data science audience and for a business audience [cclxxvi] ● Demonstrate solid communication skills (written and verbal) [cclxxvii]		
Deploy and monitor a validated model in an operational environment	Deploy and monitor a validated model in an operational environment[cclxxviii]	● Demonstrate how to deploy a model [cclxxix] ● Demonstrate the ability to monitor model performance and to define thresholds for model re-training [cclxxx] ● Demonstrate how to use a deployed model from a Python application[cclxxxi]		
Deploy and use a deployed model	Demonstrate through a project the ability to deploy and use a deployed model[cclxxxii]	● Demonstrate the ability to complete a small project building a simple application that will use a machine learning deployed model to predict results[cclxxxiii]		

Understand the concept of big data, and how big data is used at organizations	Understand the concept of big data, and how big data is used at organizations[cclxxxiv]	● Understand what big data is and how big data is used at organizations [cclxxxv] ● Understand the concepts and major applications of distributed and cloud computing paradigm[cclxxxvi] ● Demonstrate knowledge of the big data ecosystems[cclxxxvii]		
Understand the big data ecosystem and its major components	Understand the big data ecosystem and its major components[cclxxxviii]	● Demonstrate knowledge of how each major component in the big data ecosystems works (HDFS, YARN, MapReduce, Spark, Pig, Hive, Flume, Flink, Kafka, etc.) [cclxxxix] ● Demonstrate hands-on experience with HDFS, MapReduce, Spark, Pig, Hive[ccxc]		
Participate as a data scientist on client engagements (internal or external)	Participate as a data scientist on client engagements (internal or external) [ccxci]	● Participate as a data scientist in a minimum of 2 projects with clients (internal or external) [ccxcii] ● Demonstrate teamwork abilities, and the ability to manage project risks, and stakeholder conflict[ccxciii]		

Teaching or mentoring others	Contribute to the profession by teaching or mentoring others[ccxciv]	● Demonstrate commitment to the profession by writing publications, and teaching and mentoring others [ccxcv] ● Demonstrate the ability to create reusable assets such as notebooks, libraries and documentation[ccxcvi]		
Skunkworks	To keep current with the latest developments.	● Try out new techniques and new technologies that may later be adopted more widely by colleagues. The "skunkworks" team would be staffed by capable programmers / data scientists / statisticians.	● Programmes ● Data scientists ● Statistician	

4.3 Innovation

Types of capabilities	Description	Skills required	Job roles to deliver these capabilities	What this enables the organisation to do
Product/Service Innovation[ccxcvii]	To define, develop, and deliver profitable new offerings, ranging from incremental to breakthrough. [ccxcviii]	● The ability to define, develop, and deliver profitable new offerings, ranging from incremental to breakthrough. [ccxcix] ● People skills such as creativity, drive, insight, pattern recognition, competitive and market awareness, etc. [ccc] ● Teamwork – assigning the right people to the right jobs and blending diverse and complementary talents. [ccci] ● Processes, tools, and methods to gather data and insights; test hypotheses and concepts; and more. Includes data analytics, algorithms, machine learning, AI, behavioral science, design thinking, and more to assist in data collection and interpretation. [cccii] ● Customer insight derived from multiple sources, both online and in person. Know what questions to ask, listen empathetically without bias, identify the right 'problems to solve' and/or 'jobs to be done. [ccciii]		

		● Portfolio management. Strategic capability in the areas of risk/reward assessment, idea/initiative management, project selection, go/kill decisions, and resource allocation. [cciv]		
Collaborative Innovation [cccv]	To take product/service delivery to the next level.	● Through partnerships, acquisitions, incubators and co-innovation centers companies can test new ideas and accelerate delivery as well as increase capability. Digital experiences require ecosystems and multiple alliances to coordinate the full spectrum of services and technologies. [cccvi] ● Internal collaboration must advance as well. [cccvii] ● R&D and marketing need to speak a common language and set unified goals. Software will increasingly be embedded with 'hardware' – agile development methods like scrums and time-boxed sprints should be part of the process. [cccviii] ●		
Digital Innovation [cccix]	Delivering fast, personalized customer experiences	● Delivering fast, personalized customer experiences requires deep customer insight. Companies need to know what customers need now and what they will need in the future. This		

		requires alignment between technology and business functions, along with shared real-time data. ● Capabilities and skills around data science, analytics and interpretation are paramount. [cccx] ● The main technologies enabling digital transformation are data science, AI and machine learning, and the cloud. [cccxi] ● Data science helps to understand and optimize the customer journey. AI and machine learning are necessary for personalization and enhancing the customer experience. With machine learning, large amounts of data can be translated into insight and action. Finally, cloud enables digital transformation and scalability on the infrastructure side. [cccxii]		
Innovation project management and delivery	● Tracking project progress in real time and understanding why something may not be working. [cccxiii]	● Tracking project progress in real time and understanding why something may not be working. [cccxiv] ● Offering practical advice and support to problem solve. [cccxv]	● Design-led project manager[cccxxi]	

		● Being a “cheerleader” so the wider city government/local authority recognises the team’s achievements.[cccxvi] ● Knowledge of city government[cccxvii] ● Strong oral and written communication skills. [cccxviii] ● Ability to work with people at all levels of government. [cccxix] ● Exceptional drive for impact. [cccxx]		
Citizen & Stakeholder engagement	Actively involving citizens, external stakeholders, and unusual suspects.[cccxxii]	● Creative engagement of partners, of a range of players—city governments, local authorities, regional government/combined authorities, and national governments, NGOs, and citizens. [cccxxiii] ● Creative facilitation by supporting people to communicate their needs or concerns and encourage them to share a broad range of perspectives and goals. [cccxxiv]	● Design led project manager[cccxxx]	

		● Reflection on own blind spots and biases. [cccxxv] ● Empathy and curiosity to understand both problem (and possible solution) from the perspective of others. [cccxxvi] ● Agility to adapt and change approaches and methods. [cccxxvii] ● Using statistical data, existing theories and assumptions, and challenge these by listening to people's everyday experiences - through engagement, meaningful conversations, and in-depth research. [cccxxviii] ● Managing conflicting views and dominant self-interests.[cccxxix]		
Exploration and testing new ideas		● Future Acumen: connecting long-term vision with short-term actions. [cccxxxi] ● Exploring (rather than predicting) what the future could be because nothing is certain. Identifying small steps that	● Design Methods Lead[cccxl]	

		might contribute to reaching a long-term vision.[cccxxxii] ● Creating a safe space where all people feel comfortable sharing their views as collaborators; supporting this with a diverse range of tools to stimulate participants. [cccxxxiii] ● Outcomes focused and action orientated to form a vision and actually achieve it. [cccxxxiv] ● Reflexivity to understand what is working (and what isn't) and identify what needs to change. [cccxxxv] ● Agility to change course and reassess the vision when circumstances change. [cccxxxvi] ● Exploring outcomes using a trial-and-error approach, drawing on prototyping. [cccxxxvii] ● Creative thinking skills and the inclination to constantly challenge and test assumptions[cccxxxviii]		

		● Problem solving and critical thinking[cccxxxix]		
Experimentation and testing		● Using effective methods and techniques to generate new ideas. [cccxli] ● Structured project and performance management to turn new ideas into detailed implementation plans. [cccxlii]		
Exploration and learning from what has worked before – and what hasn't		● Analytical capabilities, such as quantitative data analysis and qualitative investigation such as research, interviews, and observations. [cccxliii] ● Using a mix of qualitative and quantitative data from different sources, to develop new theories and ideas about what might work. [cccxliv] ● Exploration of existing solutions that have been successful elsewhere, and those which haven't, to enable		

		replication, adaptation and adoption. [cccxlv]		
Progress tracking and impact measurement		• Tracking and using information to understand a problem—how things are working, trends over time, what has been tried and to what effect—underpins successful development and implementation. [cccxlvi]	• Design-led project manager[cccxlvii]	
Project management	Iteration is about the incremental and progressive development of a project.[cccxlviii]	• Iterative project management techniques (such as sprints or time-boxes, product backlogs or workflows, and retrospectives) where each stage builds on the preceding stage and there is greater opportunity to adapt and amend. [cccxlix] • Lean and other continuous improvement methodologies.	• Design-led project manager[cccl]	

Iteration[cccli]	Incrementally and experimentally developing policies, products and services[ccclii]	● Developing prototypes that can be used with users/citizens to test feasibility.[ccliii] ● Refining and improving prototypes to explore the ability to scale-up a project or service, and identify potential issues.[ccliv] ● Using sand-boxes, prototypes and experiments allows officials to check step-by-step whether something is working and if not take action sooner rather than later[ccclv]	● Design Methods Lead[ccclvi]	
Testing and experimentation	Tests and experiments provide a robust way of evaluating whether an approach works.[ccclvii]	● Using large-scale randomised tests to evaluate approaches such as A/B testing or randomised control trials to gain evidence about what works.[ccclviii]		
Data Literacy[ccclix]	Ensuring decisions are data-driven and that data isn't an after thought[ccclx]	● Basing decisions on data and evidence ● Building systems that collect the right data ● Communicating data effectively.[ccclxi]		

		● Using multiple sources of data to get a better picture about a particular situation. ● Using regular feeds of information to identify emerging patterns, and deal with problems before they become too serious. [ccclxii]		
User centricity[ccclxiii]	Public services should be focussed on solving and servicing user needs[ccclxiv]	● Policies and services solve user needs ● Considering users at every stage ● Ensuring users say "I would do that again".[ccclxv]	● Design leader[ccclxvi]	
Solving user needs	Public services are delivered for the benefit of citizens. Modern public services should respond to clearly identified needs. [ccclxvii]	● Using a range of research methods (questionnaires, in-depth interviews, workshops, ethnographic observation) to obtain insights about users. Regularly testing, re-validating, and identifying new user needs throughout the development and delivery of a project. [ccclxviii] ● Ensuring sufficient time is devoted to conducting user research to gather,	● Design Methods Lead[ccclxx] ● Design leader[ccclxxi]	

		analyse, validate and prioritise user needs. Testing services with users to assess how well they meet the needs of users. [ccclxix] ●		
Focussing on users at every step	Users and their needs must be considered at every stage of a project, not just at the beginning and the end. [ccclxxii]	● The user should always be at the centre of a project team's thinking. Users shouldn't just be considered when generating ideas and launching a product or service – but throughout the design and development of products and services. [ccclxxiii] ● Ensure every stage of a project includes user testing or makes use of "user advocates" (team members who role play a use) to analyse whether user needs are being met, or how to meet them[ccclxxiv] ● Regularly refer back to the identified user needs and assess a project's current progress to see if needs are	● Design leader[ccclxxvi]	

		being met. Identify opportunities to demonstrate or test our ideas and interim versions of services with users. [ccclxxv]		
Considering how users think and act	People don't always behave in the way we expect. Using human centred design principles and behavioural science can result in better policy and services. [ccclxxvii]	● Understanding that by designing policy and public services around how human beings think and interact will make it easier for them to use a product or service and thus for government achieve desired policy outcomes. [ccclxxviii] ● Identifying, analysing and deconstructing "user journeys" to consider users pass from step to step in using a service. Working with relevant partners to ensure users with particular needs (e.g. accessibility/mobility needs) can use a service or have alternative options. [ccclxxix] ● Working with specialists in user experience/interface design to develop systems that are human-centred.	● Design leader[ccclxxxi]	

		Working with specialists in behavioural science to use psychological and sociological techniques to deliver public policy outcomes (e.g. “nudge”) . [ccclxxx]		
Involving users in projects	Working with “real” users ensures that project teams can better understand user needs and their situation. [ccclxxxii]	● Get involved in user research and testing, sit in on or conduct interviews, workshops or observation. Use a variety of methods to record and display the results of user research (images, written notes from users, videos). [ccclxxxiii] ● Use participatory approaches to design, develop, test, and implement projects that involves users directly in the production and decision-making, resulting in co-ownership of the output. [ccclxxxiv]	● Design Methods Lead[ccclxxxv] ● Design leader[ccclxxxvi]	
Curiosity[ccclxxxvii]	Seeking out and trying new ideas or ways of working[ccclxxxviii]	● Identifying new ideas, ways of working ● Adapting approaches used elsewhere ● Reframing problems and perspectives. [ccclxxxix]	● Data business developer[cccxc]	

			• Director of performance and accountability[cccxci]	
Seeking out new ideas[cccxcii]	Innovation is about invention, creating new things, and doing things differently. [cccxciii]	• Proactively seeking out feedback from a wide range of users and sources and analysing that feedback for ideas. [cccxciv] • Talking to colleagues, stakeholders, and users about potential opportunities for improvement – what ideas do they have? [cccxcv] • Facilitating creative workshops to discover and explore new ideas and approaches. [cccxcvi] • Using challenges, awards and prizes to encourage people to think differently. [cccxcvii] • Using large-scale methods such as crowdsourcing and text mining to gain insight. [cccxcviii]	• Design Methods Lead[cccxcix]	

Reframing problems and solutions[cd]	[cdi]	● Understanding and appreciating that people have different perspectives on a topic, problem or situation as a result of their background, experience and knowledge.[cdii] ● Identifying different actors and stakeholders that are involved in or influence a situation. Deconstructing their position to understand how and why they might think about the situation in a different way from yourself. [cdiii] ● Using tools such as vignettes and personas to exemplify how different people think about a situation. Using role-playing games to enable people to think about a situation from a different perspective. [cdiv]	● Methods expert – delivery[cdv] ● Data business developer[cdvi] ● Director of performance and accountability[cdvii] ● Data analyst[cdviii]	
Adapting approaches	Many teams have similar objectives, but they rarely have the same approach to meeting those goals. [cdix]	● Understanding that there is no single way of doing things, while systems and public services are often standardised	● Methods expert – delivery[cdxiii]	

		for operational efficiency other organisations can have a different approach. [cdx] ● Engaging with teams/managers who do the same work as you – finding out what they do and how they do it, identifying what is different about their approach. [cdxi] ● Seeking out organisations from different organisations, sectors, locations/countries who have similar objectives or goals to analyse their approach. Asking others to "peer review" your approach and identify alternative options based on their practice. [cdxii]	● Data business developer[cdxiv] ● Director of performance and accountability[cdxv]	
Continuously learning[cdxvi]	Knowledge is being produced and practices are evolving at an ever increasing rate. [cdxvii]	● Understanding that in a constantly changing world knowledge and practice are no longer fixed, there is always something new happening somewhere[cdxviii]	● Methods expert – delivery[cdxxii] ● Data business developer[cdxxiii]	

		● Being open to new ideas and thinking no matter where it comes from, actively considering the possibilities and opportunities new ideas present. Assessing the limitations of your own knowledge and practice and finding opportunities to learn more. [cdxix] ● Actively reflecting on what lessons you have learnt and using that to question your assumptions and current practices. [cdxx] ● "Un-learning" previously acquired knowledge, practices and ways of thinking that are no longer applicable or relevant. [cdxxi]	● Director of performance and accountability[cdxxiv] ● Data analyst[cdxxv]	
Storytelling[cdxxvi]	Explaining change in a way that builds support[cdxxvii]	● Using narratives to explain 'the journey' ● Including 'user stories' to outline benefits ● Progressing the story as situations change. [cdxxviii]		

Using narratives	Stories are a natural way in which people share information and pass on knowledge. [cdxxix]	● Understanding that stories communicate facts, opinions and situations by relaying experiences, making it easier for audiences to comprehend key messages. [cdxxx] ● Identifying key actors and stakeholder (your 'characters') and constructing a story outlines their experiences and motivations. Ensure your story not just covers what has happened and is happening, but also what will happen to key characters in the future. [cdxxxi] ● Stories are not static artefacts, they must be progressed as situations develop. Stories should adapted for each audience, and accommodate alternative viewpoints. When talking about the future, stories can help explore uncertainties and possibilities. [cdxxxii]	● Design Methods Lead[cdxxxiii] ● Methods expert – educator[cdxxxiv]	

Telling user stories	Stories can be a powerful and effective way of expressing user needs and priorities[cdxxxv]	● User stories are a way of communicating the way a user or groups of users experience a policy or service, they enable officials to empathise with the user and understand their needs[cdxxxvi] ● Developing a story that follows the journey of typical user, identifying what they find easy and difficult to do. [cdxxxvii] ● Using the perspectives and experiences of service users and citizens to outline and explain the rationale for changes [cdxxxviii] ● Telling the stories of actual users enhances the authenticity of the overall message, by contributing their "real" voice and views. [cdxxxix] ● Combining stories from a number of users to give a holistic picture, identifying common challenges and particular needs. [cdxl]	● Design Methods Lead[cdxli] ● Methods expert – educator[cdxlii]	

Working with multiple media and methods	Different people absorb information in different ways, using a variety of methods helps spread your message as far as possible. [cdxliii]	● Understanding that metaphors and imagery are powerful devices in stories that can help explain complex ideas or situations. [cdxliv] ● Testing and refining drafts of your story with others to identify the best way to communicate key messages. [cdxlv] ● Incorporating visual elements (images, charts, graphics, videos, animations) into your story to provide context or salience. [cdxlvi] ● Using interactive tools/methods to create a "story book" that allows audiences to navigate through the story and focus on parts that are the most relevant for them. [cdxlvii] ● Enabling audiences and users to contribute their own content or stories. [cdxlviii]	● Design Methods Lead[cdxlix]	
Teaching lessons	Public sector innovation is driven by exchanging knowledge and practice.	● Sharing experiences is an important element of public sector innovation, by	● Methods expert – educator[cdliv]	

	Stories can be a useful device for sharing your experiences.	sharing your experiences you help ensure people don't have to learn the same lessons over and over. [cdl] ● Conducting retrospectives at important stages of project to identify lessons that can be learnt from the experience so far. Conducting "show and tell" sessions with colleagues to share information and experiences about a particular project. [cdli] ● Using a range of methods to broadcast your stories and lessons – e.g. blogs/social media, seminars, and conferences. [cdlii] ● Acting as a mentor or coach to other public servants, using lessons from your experience to help them in their practice. [cdliii]	● Data analyst[cdlv] ● Director of performance and accountability[cdlvi]	
Insurgency[cdlvii]	Challenging the status quo and working with unusual partners[cdlviii]	● Challenging the usual way of doing things		

		● Working with unusual/ different partners ● Building alliances for change[cdlix]		
Challenging the status quo	Innovation is about doing something new and there are often many voices that resist doing things differently	● Understanding that "it's always been done this way" is not an acceptable defence for poor service performance or quality. Meanwhile, alternative approaches should not be dismissed because of a "if it's not broken don't fix it" mentality. [cdlx] ● Approaching untested/unusual approaches or ways of working with an openness to trying them out. [cdlxi] ● Using evidence and logic to robustly challenge existing approaches, or to promote alternative options. [cdlxii] ● Identifying existing boundaries and limitations and finding ways to overcome them or work-around them without breaking the law or causing people harm. [cdlxiii]	● Data business developer[cdlxiv] ● Director of performance and accountability[cdlxv]	

Trying out things that might not work	Public services need to "fail fast", identifying more quickly and earlier when something isn't working and why.	● Understanding and accepting that when trying something new there is a possibility it might not work. This should not be viewed as "failure" but an opportunity to learn more – identifying what does and does not work. [cdlxvi] ● Developing testing and piloting routines to try out and demonstrate new ideas and approaches on a small scale. [cdlxvii] ● Ensuring the right data is being captured and analysed in a timely fashion to provide feedback about project progress. [cdlxviii] ● Giving teams the opportunity to do new things and providing support to them to overcome the fear of failure. [cdlxix] ● Developing business cases and working with corporate functions to explain the potential opportunities of innovation. [cdlxx]	● Data business developer[cdlxxi] ● Director of performance and accountability[cdlxxii]	

Building alliances for change	The challenges faced by the public sector today demands greater and deeper collaboration.	● Trying to innovate in the public sector on your own can be a lonely and impossible challenge, collaboration with others can improve your chances of success and the provide a safe space to explore ideas and ask questions. [cdlxxiii] ● Identifying and convincing potential allies to support your vision, highlighting the benefits for them. Developing a vision, narrative and message that all stakeholders involved in the project share and jointly own. [cdlxxiv] ● Working with external stakeholders and advocacy groups to amplify your message and agenda for change. Sharing people and resources (through virtual teams or agreements) to enable joint ownership and delivery of a project. [cdlxxv]	● Design leader[cdlxxvi] ● Data business developer[cdlxxvii] ● Director of performance and accountability[cdlxxviii]	

Working with unusual partners	Working with people you might not ordinarily consider could result new synergies and approaches.	● People who are very different from you or who work on something very different, is no reason not to work with them, they may have valuable insights and practices that you haven't thought of. [cdlxxix] ● Working across boundaries within and between organisations to identify new contacts and partners in the public sector. [cdlxxx] ● Respecting that people have different backgrounds and perspectives, what is 'unusual' to you may be 'normal' for them. [cdlxxxi] ● Leveraging your existing networks to find new partnerships – who do your stakeholders work with that you don't. [cdlxxxii] ● Proactively engaging with unusual partners, identifying the benefits to them of working with you. [cdlxxxiii]	● Data business developer[cdlxxxiv] ● Director of performance and accountability[cdlxxxv]	

Data driven public services	Data being used at the right time to make the right decision. [cdlxxxvi]	● Building public services and systems that can collect large volumes of data. ● Using methods such as predictive analytics or machine learning to improve delivery and raise alerts about emerging issues. [cdlxxxvii] ● Incorporating data specialists as full members of the project team (either as direct or virtual team members). ● Developing a collaborative relationship rather than the traditional customer supplier relationship between policymakers and analysts. [cdlxxxviii] ●	● Data business lead[cdlxxxix] ● Data business developer[cdxc] ● Director of performance and accountability[cdxci] ● Data analyst[cdxcii]	
Explaining data and results	● Effective communication about data and the results. [cdxciii]	● Actively engaging with non-specialists to illustrate how the data you hold and the results it can generate will help them achieve their goals. ● Using a variety of methods to bring data and information to life for non-specialists (both visual and verbal	● Design Methods Lead[cdxcv] ● Data business lead[cdxcvi] ● Data business developer[cdxcvii]	

		methods, static and interactive visualisations, etc.) ● Understanding that some people aren't as naturally comfortable with numbers and data as others. Communicating key themes from results and simple "need-to knows" about methodology and limitations[cdxciv]	● Director of performance and accountability[cdxcviii] ● Data analyst[cdxcix]	

5. Case studies

This section collates examples of digital, data and innovation capabilities deployed in local government.

Local Government Association

The Local Government Association (LGA) collated nearly 50 examples of digital and technological innovation, combined with the use of customer insight, demand management, lean and systems thinking, and collaborative thinking. These examples include:

Digital innovation, including councils utilising procurement frameworks to secure the technology and digital resources they require in new ways. This includes cloud-based services, from email and applications ('apps') to the government's G-Cloud procurement service – among many others. Examples include the **London Borough of Hillingdon** saved £750,000 a year through moving to Google Apps.

The potential of '**open source' systems** is also being exploited – **Shropshire Council's Project WIP** open source website service saved £204,000 over an initial five-year period.

In the face of budget cuts, increased tax burdens for landfill, and challenging targets to improve recycling, councils are exploiting GPS mapping technology to improve the quality and cost of waste collection, achieve **better procurement**, and develop more **efficient service partnerships. Forest Heath District Council** and **St Edmundsbury Borough Council** saved £300,000 annually and improved services, the **District of East Northamptonshire Council** saved £200,000 annually, and **Middlesbrough Borough Council** saved £150,000 a year, all using similar technologies.

The **development of transactional services online and on mobile devices** is flourishing. **Hammersmith and Fulham's** online self-service portal has saved £1.15 million annually, with 70 per cent of households registered. The **London Borough of Barking and Dagenham** has achieved a 100 per cent digital shift for benefit claims, reducing processing time by 30 days and saving £617,000 annually, while the **London Borough of Harrow** has saved £1.55 million over four years through a wide range of online services.

Spelthorne Borough Council used the Engage mobile app to meet customer expectations for online access, encourage channel shift and improve service delivery. The app was developed and implemented in less than five months and saved the council approximately £43,800 last year.

East Riding of Yorkshire Council takes payments through self-service thanks to their mobile-accessible website and self-service kiosks. This has generated savings of £91,500 over a three-year period.

Bristol City Council used **mobile technology** in a different way. By providing its neighbourhood-based staff with tablet devices with appropriate software and apps, the council enabled them to report issues while out in the community. As a result it has reduced the hours staff spend in the office and increased reporting of local issues, as well as supporting digital take-up in the community.

Technology has also improved access to services.

The **London Borough of Lewisham's** web and mobile application LoveLewisham enables residents to report environmental issues, leading to a 73 per cent reduction in graffiti, and a 33 per cent drop in call-centre activity, saving £500,000 over the past five years.

Telford and Wrekin Council, in rural Shropshire, set up the Everyday app in less than four months. The app, which is able to work offline when a mobile signal is not available, has saved £5,000 in contact costs.

Birmingham City Council reduced rent arrears by £134,000 year-on-year through a new triage process and personalised 'digital log books'.

Rushcliffe Borough Council, **North Dorset District Council** and **Melton Borough Council** focused on digital inclusion through organising training in literacy and ICT skills.

Making joined-up services accessible in one place has been highly successful in the **London Borough of Croydon**, where the 'family-focused' website, Family Space, enables easier access to information on local children's' services. Similarly, the national Tell Us Once project, which enables people to report a birth or death just once and has been implemented in over 90 per cent of councils, is delivering total benefits of £22 million annually.

Councils have also saved significant amounts through the **use of telecare and assistive technologies**, which help to manage the significantly increased demand on health and care services by supporting the growing elderly and physically disabled population to live independently. Councils that have implemented telecare successfully across the country include **Blackburn with Darwen**, which has saved £10 million in the last four years, and the **London Borough of Hillingdon**, which has saved £4.597 million to date by integrating telecare and reablement.

Technology can also help to bring people together. The Casserole Club in **Barnet** uses a sophisticated website to match volunteer cooks with people who would benefit from a home-cooked meal. The

project is saving money on home delivery and strengthening neighbourhoods. **Cheshire East Council**, working with Age UK, has developed an **online social media** and information site for people living with dementia, helping users to continue living independently and enjoy an improved quality of life. **Central Bedfordshire Council** with **Cambridgeshire County Council** ran a pilot offering elderly residents the Mindings app on tablet devices in free trials. The app allows people to keep in touch with family members living alone, and the trial showed significant improvements in quality of life.

In **Suffolk County Council**, **customer insight tools** were used to better understand the needs of troubled families, saving more than £450,000 over four years in cost avoidance.

Staffordshire County Council has co-developed Patchwork, an online tool which allows front-line staff to quickly log in and see which other agencies are supporting their clients. There are 64 agencies, supporting almost 2,350 clients, signed up to Patchwork.

And technology can **support cross-organisation and collaborative working**. **Lewes District Council** is using 'pam' collaboration software to enable staff across all partner agencies to work in a more joined-up way. **Suffolk Coastal Port Health Authority** developed a dedicated ICT system to better manage the process of checking imported produce at Felixstowe. This has now generated savings of £200,000 a year since it went live in 2009 and has been licensed to other Port Health Authorities.

Technology can also be used for continual improvement, as in **Leeds City Council**, where live web chat provides support to website users. As well as web chat being cheaper than a phone call, the council learns from the problems identified, and to date over 400 changes to the website have been made as a result in just eight months.

Source: LGA (2014) Transforming local public services using technology and digital tools and approaches. Available online: https://www.local.gov.uk/sites/default/files/documents/transforming-public-servi-80e.pdf

London Borough of Bexley: cracking the cyber security challenge

The challenge: The tipping point between the old and the new security regimes was the result of coinciding Cyber Essentials and PCI DSS (Payment Card Industry Data Security Standard) audit reports. From both of these it became clear that there were gaps in areas such as intrusion detection and log management. It was also recognised that what was being undertaken at the time, wasn't good enough and a new system was required. However budget restrictions, availability of in-house skills and the time needed to set up and run a SoC tool, all created challenges.

The London Borough of Bexley relied on a Security Incident and Event Management (SIEM) tool to manage security, this was initially purchased for compliance and used for vulnerability scanning. The SIEM tool was particularly weak around log and event management and difficulties with initial configuration and day-to-day use meant that it wasn't producing the data that Bexley needed and was not being updated. In fact the challenges faced were significant even for someone with considerable skills in cyber security. The Borough needed something that dealt with the logs in a better way as the tool at the time was just sending raw data and it was difficult to understand what was going on.

The solution

We always considered that the responsibility for managing cyber security should be owned by the authority and as such was never outsourced. However there comes a point when a major change of strategy becomes unavoidable. We therefore selected a comprehensive, best in breed managed cyber security service from Hytec. The service addresses the very particular set of issues faced by local authorities; it significantly enhances the protection of systems and data, helps achieve compliance requirements and ensures appropriate security mechanisms are in place. Our partnership approach to cyber security has significantly raised levels of cyber security, and this has proved invaluable. Bexley's managed security service from Hytec is made up of five core areas including: activity detection; threat intelligence; protective monitoring; asset ID and management; and vulnerability scanning. Our service partner managed the entire council network and now have access to the same "single pane" one-window view of the security posture of the entire estate. Both our service partner and our internal team also have the same view of the infrastructure and this has improved reporting and strengthened the working relationship. The implementation process was very smooth and straight-forward. We just fired up a couple of virtual servers and Hytec did the configuration work and it was pretty much dealt with, then it was working and we were receiving information and filtered alerts about events that we never knew were happening.

It did not take long before a high priority alert came through from the Hytec team. Essentially, we were aware of an external facing service that was in place which had minimal use and would be phased out at some stage. But we had no visibility of how often it was getting attacked or how vulnerable it was. The alarms that started coming through quickly made it clear to us that the risk to the organisation was far higher than we realised. It gave me the knowledge I needed to take the business decision to shut the service down immediately. Which potentially saved us from a compromised situation.

Today new security protocols are being introduced, facilitated by the Hytec service. Compliance is giving more impetus to some areas than others. File integrity monitoring is the latest service to be implemented. Initially, file integrity monitoring looked like a bit of a minefield and the team thought that it was going to be really difficult to implement. It turned out not to be too difficult, as our managed cyber security service sent the logs and the output needed and they made it really easy for the team.

The impact

The security landscape can be a confusing and frustrating area where hidden costs can quickly escalate and IT tools often do not deliver their promised gains. However through our partnership with Hytec, our experience has been very different. The impact has been outstanding. Through access to a complete service (people, process, technology, intelligence and compliance), we have ensured that our council's security ambitions are realised. It has been possible to reduce the likelihood of serious security incidents to a minimum. Taking a managed security service approach has supported our in-house ICT team's incident response procedures and informs them of the necessary corrective actions should an incident occur. Bexley has strengthened its cyber defenses considerably. We are also able to check the accounts in use in Bexley, and from other non-UK territories at the same time, there is often a rational explanation for this, but before deployment of the managed security service Bexley had no view of this.

In a recent typical month, there were some 18 million possible security events, and from this about 2,000 alarms have been generated of which around six have been escalated via email and other means for further investigation, keeping Bexley cyber-safe.

Source: https://www.local.gov.uk/london-borough-bexley-cracking-cyber-security-challenge

Middlesbrough Council: an app to collate and visualise data to aid the response to Covid-19

What happened: The council established thematic working groups with local stakeholders to work on different sectors of accommodating recovery and renewal in the face of covid-19 challenges. This recovery group sought to launch an app that would host information on the town centre's shops, restaurants and cafes in a move designed to boost the accessibility and real time information on local businesses that often lags behind the usual online search engines. Furthermore, the group wanted an app that did not duplicate but add a quality of information to an already crowded space

in the covid-19 narrative. The app therefore embraced a smart places agenda to create hub for data inputs to produce a reliable source of visualised information.

Solution: The Visit Middlesbrough App provides important travel and safety information to encourage a controlled return to the town centre using sensors to track footfall to allow the most vulnerable and shielded people plan their visits by highlighting the quietest and safer times of the day. The app is also working to integrate rail and bus company timetables that also provides a seat counter to let residents know the busier times for the public transport system. Users will also have the latest news from the council immediately at their fingertips with push notifications to receive up to date covid-19 information directly.

The App rather than developing a completely new map system, integrates google maps information and interface to provide easy and direct access to local business websites, contact details and opening times. The council want to make it as easy as possible for residents to find relevant information given the ever-changing environment with restrictions. The app also has accessibility options for text size and day/night mode to ensure the usability is as easy as possible.

Through a £20k fund the council onboarded Dominic, Lusardi, digital consultant/project manager, and supplier MCD, a Digital Product Engineering Company based in Middlesbrough's Boho Zone, who have offered extensive support and development opportunities for council staff to learn the skills to update and work on the app through a wireframe structure that ensures a high level of content management for the app.

Moving forward the council and recovery group are seeking out new opportunities to develop the app by including a 'What's on Guide' when lockdown restrictions make this possible. This would include events profiles, QR codes or beacons for front of house in shops that will be accommodated with discounts and offers to encourage residents to return to shops, businesses and cultural venues.

The app is available for free on the Apple App Store and Google Play. Search 'Visit Middlesbrough'.

Source: https://www.local.gov.uk/our-support/efficiency-and-income-generation/digital/digital-best-practice

Plymouth Good Neighbours Scheme

Plymouth City Council have helped community groups and charities gain access to resources they need—including buildings, fleet services and volunteers—through the Plymouth Good Neighbours Scheme. The council run initiative achieves this via an online platform, which invites these groups to raise specific support requests, while asking potential volunteers (individuals and businesses) to share what skills and resources they have to offer. Using this information, the council are able to facilitate suitable matches between those who offer support and those who request it. The result is a mutually effective COVID-19 response – supported by community groups and charities with greater access to the resources they need and volunteers, deployed in ways that match their skills and interests. The platform also invites individuals and groups to share ways that they are currently supporting the community. This information is collected to help avoid acts of duplication that might otherwise lead to a waste of resources.

Source: https://www.local.gov.uk/our-support/efficiency-and-income-generation/digital/digital-best-practice

Dorset County Council Virtual Courts

Dorset Council have worked with local judges and numerous internal stakeholders to embed a digital solution to enable Family Courts to continue despite the lockdown restrictions imposed by the COVID-19 outbreak. Family Courts provide vital services to the children and families of Dorset and are a vital cog in the process in ensuring the most vulnerable children can be safeguarded through issuing proceedings under the Children Act. Hearings within the family court are not traditionally run electronically, requiring, in most cases, physical face to face meetings involving social workers, judges, the other parties to proceedings and legal representatives.

Dorset were requested by the local Designated Family Judge on Wednesday 18 March to provide an electronic solution to enable the provision of safeguarding, with a deadline set for Monday 23 March. The responsibility for this would usually fall with the courts; however the court was not able to facilitate the processes required, so passed responsibility to the local authority. Though the council had limited requirements and was not familiar with all the necessary stakeholders, the first court hearing was able to take place the following day.

The council has attributed this achievement to the following:

- Quickly building relationships and establishing a common collaborative internal team across Children's Services, the Child Care Legal Team, ICT, Property and Estates – primarily through MS Teams.
- Understanding the problem– must have MVP requirements, documenting a process to elicit requirements and identify ASAP:

Working with colleagues to ascertain tools that could meet the requirement, adopting common sense and pragmatism – the decision was to use Skype, which at the Council is a tried and tested technology (Dorset Council had only recently started to use MS Teams and staff did not yet have expertise in the platform; and their Skype rooms did not then support MS teams – for this reason, MS Teams was discounted).

Skype recording - Skype Video conferencing units with 1 room in Weymouth 1 in Ferndown – available to be booked by DC on behalf of families and their solicitors. The Skype rooms are simple to use – with one click, participants can join the meeting. It is understood that Dorset was the first local authority in the UK to provide this level of support to parents in care proceedings, something which was recognised by the senior judiciary.

Reflecting on the implementation of the new system, the Dorset Council have highlighted that a good understanding and prioritisation of requirements is essential to a successful agile delivery need to exercise common sense and pragmatism (focus on the most important requirements first and be prepared to adapt to evolving needs). With this, they have impressed the importance of pulling together a design for review and comment as early as possible; adding that "often issues get picked up at this early stage rather than post development – in our case we documented a process map and shared it". A further learning takeaway was that the customer should remain the focal point. In this case, that meant ensuring hearings could continue, with appropriate tools to get the job done and ensure that safeguarding responsibilities could continue – "bells and whistles can always follow".

Having made the system work in the current environment, the council are looking to it might be continued; including whether the solution can adopt capabilities from other platforms. With the easing of lockdown measures, the future direction of this work will hinge on what the court decides but the Council have expressed in enthusiasm toward working with Judges and the Court IT and admin' teams to achieve whatever is required to secure the best outcomes for children and others within the legal system.

Source: https://www.local.gov.uk/our-support/efficiency-and-income-generation/digital/digital-best-practice

Examples of smart city projects

These examples need digging into to find out more about the problem, interventions, and impacts.

- **Belfast** is beginning to develop and deliver smart city projects, from empowering planners with a single digital view of the city's infrastructure, to deploying IoT sensors.
- **New York's** Digital NYC are fostering a range of Smart City opportunities to support hundreds of digital start-ups and local entrepreneurs - while also directly addressing urban challenges.
- **Santander** in Spain is using GPS and apps for crowd sourcing citizen knowledge to make waste management more efficient.
- **Barcelona** is using IoT and other technologies to gather information on visitors and this has enabled the city to create a sophisticated tourist offering.
- **Bristol City Council** and its local university aim to maximise the opportunity presented by its new integrated transport hub by utilizing big data.
- **Westminster** is implementing smart parking to tell drivers where they can find a parking space. Smart parking cuts congestion and improves the experience of coming into the city centre.
- **Transport for London** is developing ticketless public transport by integrating and promoting the use of contactless payment cards.
- **Newcastle upon Tyne** is developing an innovation centre focussed on data and cloud computing, which also acts as a living lab to test smart energy grids, sustainable urban drainage and building sensors.
- **Glasgow** has introduced smart street lighting that not only is energy efficient but also monitors noise and air pollution and supports community safety measures.
- **Dublin City Council** is mapping local energy demand and matching it to the best local resources to find the most sustainable solutions for energy consumption. Its Smart Dublin team are also supporting a series of SBRI challenges to encourage local SMEs to develop solutions to the city's problems

Source: https://smartbelfast.city/wp-content/uploads/2018/04/Smart-Cities-Framework.pdf

6. Future research and concluding comments

This research has rapidly synthesised publicly available desk research on capabilities in innovation, data and digital. It has produced tables which detail the capability, and the key skills required. Additional work is needed to map these skills to job roles. Once the tables are complete, the next step would be to share and test these with officials in local government. Further research could also usefully explore additional dynamics and variables, such as the seniority of position or the level of competency and proficiency (i.e. entry level, managerial, senior manager, executive) in each domain.

An additional interesting future piece of research could be analyse the job roles and profiles currently used, such as by analysing Adzuna, Glass Door, and available role profiles in local government, to identify the skills hired for, and the gaps, and using these insights to help improvement local government recruitment practices.

Further research could also usefully seek out further case studies to help articulate these capabilities and make the case for the value these skills and capabilities can bring to local government. Linked to this, work is needed to understand, measure and articulate the impacts of these capabilities for local government and service design.

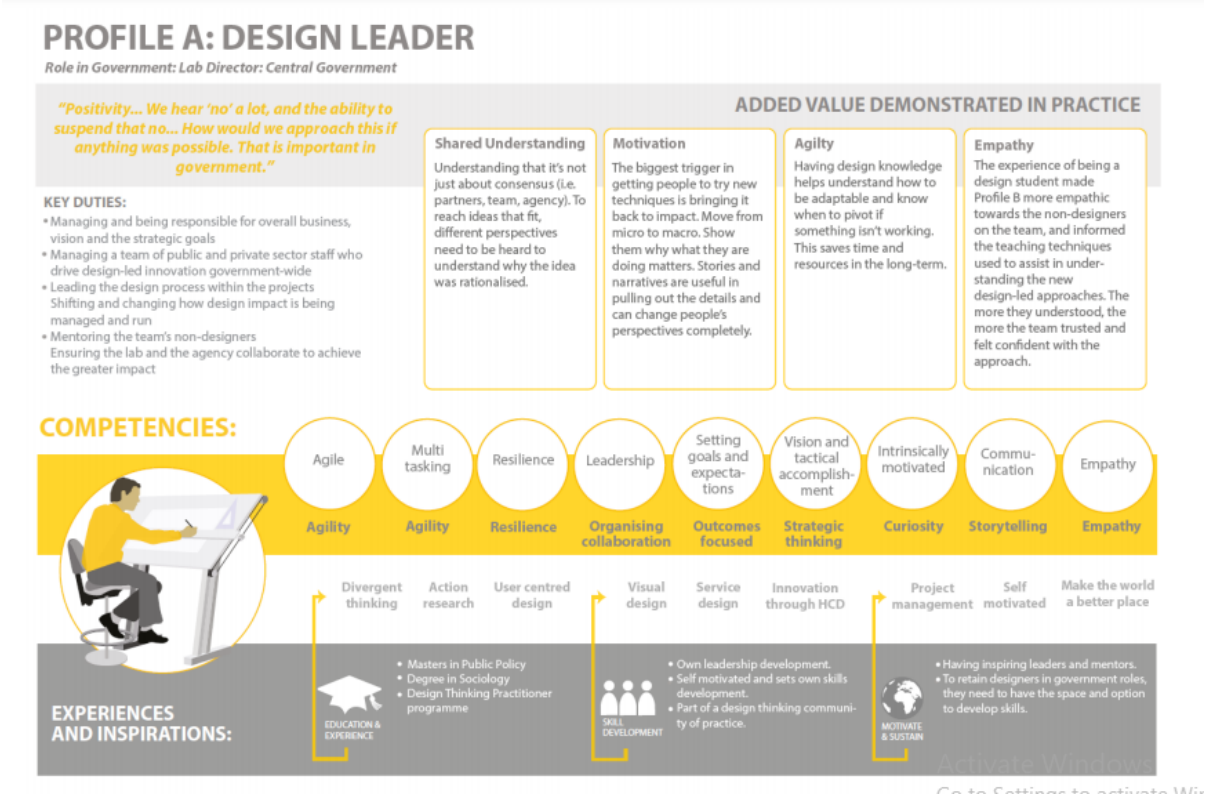
There is also a need to agree definitions for the key words and concepts. This study has identified useful prompts for this, including the glossary available on the Peter James Thomas website.

Finally, we are keen to ensure this work includes and considers multiples sources of research and ideas. If we have missed relevant research, or you have something to contribute, please let us know.

Appendix 1: a note on the research methodology

This desk research was conducted over 4 days during October and November 2020. It analysed publicly available resources, written in English, from the UK, and around the world. We drew on sources aimed at the public sector, as well as research focused on the private and not-for-profit sectors. The key words included digital capability, innovation capability, data capability, local government, city government, capability architecture, digital skills, innovation skills, digital transformation, skills in city government, and innovation in city government. The literature has been used verbatim to create the tables in Section 4, and the reference list provides a link to the original source. We are keen to hear of research, capability frameworks, and other sources of ideas, which we have missed to ensure we create robust and effective frameworks for local authorities to use. If you have ideas and research to contribute, please contact us.

Appendix 2: Example role profiles and job descriptions



Source: OECD (2017) Core Skills for public sector innovation: a beta model of skills to promote and enable innovation public sector organisations. Available online: https://www.oecd.org/media/oecdorg/satellitesites/opsi/contents/files/OECD_OPSI-core_skills_for_public_sector_innovation-201704.pdf

PROFILE B: DESIGN-LED PROJECT MANAGER

Role in Government: Lab Account Director: Central Government

"What makes a civil servant tick?"
"How do you manage projects and portfolios to accommodate this?"

KEY DUTIES:

- Building relationships with middle managers in partner with ministries to create opportunities for ongoing collaboration with the lab, and mediate with middle managers regarding concerns in adopting the lab approaches and activities
- Demonstrating to clients the practical value of adopting a more outcomes and user-oriented approach to policy development (where the focus is on creating actual change and impact at user level)

ADDED VALUE DEMONSTRATED IN PRACTICE

Empathy

Profile B uses skills developed from previous training as a sociologist to walk in the shoes of civil servants involved in the lab projects. By considering the civil servants' incentives and responsibilities, Profile B can begin to understand how to develop a programme that will receive buy-in.

Changing approach

'Intended change' is used as the starting point for projects, as opposed to focusing on the problem. This shift encourages partners and colleagues to reflect on how alterations and interventions in practice (and thinking) will lead to more concrete and longer-term impacts.

Inclusivity

Supporting empathy, the adoption of a participatory design approach demonstrates the importance of including those affected into the decision making process: *"If we design new tools that play a role in peoples' work lives, then we should democratically engage these people that are being affected."*

Cultural change

Profile B believes it is important to change the mindset among civil servants in order to help them accept that many problems cannot be solved in full. No 'perfect intervention' exists, and uses a designer approach of a 'best fit' option.

COMPETENCIES:

Outcome focused; User oriented	Create curiosity	Expose others to new methods	Translate concepts into tangible actions	Agile	Collaborate with others	Encourage courage in others	Courage to challenge the norm	Build relationships
User oriented	Curiosity	Intrepreneurial	Translation	Agility	Organising collaboration	Resilience	Experimenta -tion	Organising collaboration

EXPERIENCES AND INSPIRATIONS:

EDUCATION & EXPERIENCE

- Empathy
- Future scenarios
- Ethnography methods

- Bachelors Degree in Sociology
- IT based degree in User Centred Design
- Experience in project management and strategy consultancy

SKILL DEVELOPMENT

- Co-design
- User centred design
- Workshop design

- Creative problem solving
- EPIC Ethnographic Practice in Industry
- Scandinavian approach to participatory design

MOTIVATE & SUSTAIN

- Pushing boundaries
- Making change
- Being novel

- Doing things in a different and novel way

PROFILE C: DESIGN METHODS LEAD

Role in Government: Strategic Designer in the Innovation Lab: Central Government

"Co-creation doesn't improve the quality of ideas, it improves the ownership of them."

KEY DUTIES:

- Designing a lab to support the government to be more innovative
- Developing a strategy for the lab, including making the decisions around what projects to undertake, what skills are required in the team, what ecosystems the lab should be involved in, and which public investments (open challenges) it should consider
- Allocating the design resources under the strategy, delineate the project pipeline, and hire the team

ADDED VALUE DEMONSTRATED IN PRACTICE

Changing approach
Profile C champions a move away from the traditional approach of using evidenced based public policy (where justifications are built for existing ideas) and replaces it with an action research approach - goes into the field to understand what the problem actually is, and what ideas should be worked on.

Workshops
Profile C believes in having co-design workshops as standard practice. Co-design workshops bring together a wide range of stakeholders to develop a shared understanding of the different perspectives of what innovation should be in government and what a lab should do. These inclusive conversations are vital to get people on board.

Changing communication
Classic civil servants produce minutes, reports and uninspiring PowerPoints; a design background helps introduce new engaging stories using multi-media to not only draw people in, but generate a shared understanding by communicating effectively and inclusively.

Prototype. Prototype. Prototype.
One of the main differences from a traditional civil servant approach to a design-led one is the use of prototypes. Prototypes allow validation of an idea, to learn from it, or to have it fail quickly in order to move on to the next one without wasting unnecessary time and resources.

COMPETENCIES:

Open and learning based mindset	Ability to learn quickly	Effective allocation of design resources	Use visual communication to tell stories	Reframe/re-define policy problems	Specialist team design and recruitment	Relationship management	Creative facilitation (workshops)	Combine design and political experience
Openness	**Curiosity**	**Strategic thinking**	**Storytelling**	**Agility**	**Strategic thinking**	**Organising collaboration**	**Experimental mindset**	**Political awareness**
	Visualisation	Prototyping	Action research		Service design	User centred design	Workshop design	Self motivated	Making a difference	Future Minded

EXPERIENCES AND INSPIRATIONS:

EDUCATION & EXPERIENCE
- Currently undertaking a PhD surrounding the experience of setting up a lab
- Formally trained as an architect

SKILL DEVELOPMENT
- Has experience in building web pages, designing books, creating videos, designed social housing
- Acquired many transferable skills through these practices

MOTIVATE & SUSTAIN
- Interested in all aspects of design and its application within different contexts - very exploratory approach

PROFILE D: METHODS EXPERT - DELIVERY

Role in Government: User Researcher/Service Designer: Central Government

"Most people will need to see the insights they generate be translated into real world impact..."

KEY DUTIES:

- Understanding the needs of the users that are being designed for, and ensure these needs are being reflected in the design of/changes to services
- Ensuring that these user needs are visible for the team, to help form a shared understanding in order to collaborate successfully
- Leading the team synthesis of the research
- Involving the rest of the team in the research by introducing them to ethnography techniques, observation methods, lab testing and usability testing

ADDED VALUE DEMONSTRATED IN PRACTICE

Change in approach
A user researcher's role is not only to teach the rest of their team how to do user research, but to build the team's understanding of why it is valuable, and to demonstrate to them that a change in approach is required. Profile D achieves this by carrying out two-hour user research sessions with the team each month.

Benefit of change
The benefit of user research is that it generates qualitative data that tells the story of a user and brings the research to life. Documenting this research in multiple ways enables the user researcher to synthesise and draw out what is useful, and visualise it for others to understand and make use of it.

Sharing new methods
As part of the two-hour training sessions, the following methods might be covered: ethnography, observation, testing, lab testing, usability testing. All these approaches bring the team closer to user research. These approaches highlighted the value of listening skills, trying out new techniques, asking the right questions, and observing.

Learning cultures
Profile D accredited the work environment to benefiting employee learning and development. A space to 'work in the open', for show-and-tells to take place, where people are free to ask questions, share mistake - this creates a feeling of shared responsibility for the projects, as well as building team moral and empathy.

COMPETENCIES:

Use ethnographic research	Reflexive thinking and empathy	Horizon scanning	User insight and facilitation skills	User experiment methods	Visual design and communication	Outcomes focused	Strategic design approach	Design led approach
User Oriented	**Agility**	**Curious**	**Empathy**	**Curiosity**	**Storytelling**	**Outcomes focused**	**Strategic design**	**User oriented**
	Design thinking	Prototyping	Behavioural science		Journey mapping	User centred design	Digital prototyping	Self motivated	Ability to make a difference	Being around smart people

EXPERIENCES AND INSPIRATIONS:

EDUCATION & EXPERIENCE
- Masters in Positive Psychology
- Degree in Fashion Textiles Design and Management

SKILL DEVELOPMENT
- Skills were gained by being around new products and constantly learning about new technologies and methods, particularly within the open work environment

MOTIVATE & SUSTAIN
- Seeing insights being translated into a tangible thing
- Seeing the membrane between policy and product development dissolve would help retain designers in government

PROFILE E: METHODS EXPERT - EDUCATOR

Role in Government: Lab Director: Central Government

"Need a quote, need a quote, need a quote, need a quote, need a quote"

KEY DUTIES:

- To work alongside policy makers and the innovation director, to set up a design and user approach to policy
- making
  Organise meetings with front-line colleagues (social
- workers) to collect ideas and insights
  Organise and facilitate workshops which were attended by a specific unit to work on specific situations
- Communicate and mediate the value of design and user-led approaches to civil servants

ADDED VALUE DEMONSTRATED IN PRACTICE

Creating user insights

For Profile E, the role of service designer focused a great deal on teaching methods surrounding how to generate good user insight to work with. This developed the team's skills in conducting qualitative interviews, and learning methods of how to contact/engage hard to reach users

Changing mindsets

Championing a design thinking mindset encourages the team to think of the users first: what are their needs? The focus shouldn't be on the difficulties of the process or how to implement a solution, but being open to have user needs as a starting point, and not the usual starting point of political needs

Workshops

Workshops were used to collect ideas from the front-line staff and other civil servants, adopting a more bottom up approach. These workshops hoped to demonstrate that everyone could be a public sector innovator. A specific unit would attend a 1 day workshop and suggest solutions for current work challenges, which were then reported to top management

Testing impact

Following the prototyping stages, users are observed whilst interacting with the developed service to address questions such as: "Is the service understandable, how frequently do users use it, what is their experience of the service?" - measuring the impact of interventions assists shaping future projects and how they are approached

COMPETENCIES:

Bottom up approach to policy development	Visual design to improve communication	Design approach to re-frame/-define	Facilitation techniques to manage stakeholders	Gain insights with a range of research methods	Adopt participatory approach	Assess viability of different innovation approaches	Take user needs as a starting point	Influencing skills
User orientated	**Storytelling**	**Agility**	**Political awareness**	**Curiosity**	**Organising collaboration**	**Experimental mindset**	**User orientated**	**Curiosity**
	Design thinking	User centred design	Communication and verbal	User journeys/ scenarios	Impact testing	Interface design (UI/UX)	Make project useful for users	Ability to learn and grow	Ability to make an impact

EXPERIENCES AND INSPIRATIONS:

EDUCATION & EXPERIENCE
- Industrial Product Design Degree
- Masters in Design and Innovation Management

SKILL DEVELOPMENT
- Work experience as part of Masters
- Uncovering and researching examples of successful UCD project

MOTIVATE & SUSTAIN
- Making useful projects on social issues, despite being challenging, is motivating in itself

PROFILE F: DATA BUSINESS LEADER

Role in Government: Director of Performance and Accountability

"The focus isn't on data, but on how the applications of data analysis creates value - what is the value proposition"

KEY DUTIES:

- Using data to set goals, plan next steps and create results
- Performing analytics in projects and working as an intelligence agency to provide different departments with key insights to enable them to work in a more anticipatory way
- Understanding how we use data to create value for citizens
- Hiring staff and staff development
- Overseeing external relations and partnership management
- Verbal communication and presenting the work
- Promoting productive and innovative culture
- Trouble shooting (internal and external)

ADDED VALUE DEMONSTRATED IN PRACTICE

Improving efficiency

By 'teaching' the computer to carry out certain tasks it has freed up time for people to focus on other things.
It also increases the credibility of the work as it can be reproduced and the backup data is always there to support outcomes or directions .

Modelling and Machine Learning

Moving away from Excel and into program development, in order to use more sophisticated forms of data analysis and enabling you to tailor programmes for your specific needs. This was used, for example, to find optimal placement locations for ambulances, to reach call outs more quickly.

Meaningful application

The training approach employed by Profile F is purposely not focused on data analysis, but instead on how the application of data analysis can create value, i.e. understanding what the value proposition is - and developing resources that support this activity.

Strategic direction

The ability to reach your long and short term goals, by employing the right people to help you realise them. This requires understanding the different data (and non data) roles, and what they have the capacity to deliver on each project, as well as being able to identify the skills existing staff need to develop.

COMPETENCIES:

Good strategic direction	'Big picture' project management	Find and hire good people effectively	Encourage productive, innovative work culture	Hands off management approach	Effective and appropriate delegation	Effective negotiation skills	Combine qualitative & quantitative analysis	Excellent external relations
Strategic action	**Focused on outcomes**	**Strategic action**	**Organising collaboration**	**Intrepreneur ship**	**Strategic action**	**Organisational intelligence**	**Storytelling**	**Organising collaboration**
	Visualisation	Prototyping	Action research	Service design	User centred design	Workshop design	Self motivated	Making a difference	Future Minded

EXPERIENCES AND INSPIRATIONS:

EDUCATION & EXPERIENCE
- Masters in Public Administration
- Degree in Philosophy and Political Science
- Work experience in a Think Tank, surrounding urban politics and policy

SKILL DEVELOPMENT
- Working with cohort of fellowships in Civic Analytics network - learning from community of practice.

MOTIVATE & SUSTAIN
- Inspired by mentor in first job
- Experienced aftermath of Hurricane Catrina, the lack of public response was a big motivation.

PROFILE H: METHODS EXPERT - DELIVER

Role in Government: Data analyst embedded in social work team

"Social workers are now understanding that data isn't just a stick to beat them with. They now understand what they are writing down is useful, in and of itself"

KEY DUTIES:

- Analysing data in order to identify patterns and to gain insight into what is and isn't working in social care, leading to the
- development of interventions or changes in practice Communicating data and an engaging and understandable
- way to social workers, for them to learn from it and to inform their practice, create interventions to save money/improve citizen lives
- Taking a blended qualitative and quantitative approach, also acknowledging the expertise and insights of front line social workers

ADDED VALUE DEMONSTRATED IN PRACTICE

More applied use of data in practice...
Usually, only the back end of data is looked at, and only by the senior managers. This arrangement means that beyond using data for performance management, it is used to empower front line staff about their practice.

Merging qualitative & quantitative data ...
Social workers work with families on a day to day basis, and have insights regarding what the issues are; data analysts can bridge the gap between these inklings and the larger picture and create quantifiable, evidenced understanding of what is happening

Successful example...
This merging of qualitative and quantitative data was used to identify one perpetrator across two cases. By looking at his network and costing his social impact on other families social care journey - this highlighted the issues within the existing system and moments where interventions would have made a difference to the journey and cost

Sharing data...
In order to use the insights from the data, it needs to be made communicable to those in the practice, i.e. social workers. This is done in an engaging manner, or through mediums they already use (genograms, power point presentations and online web reports)

COMPETENCIES:

Competency	Skill
Ability to see patterns and trends in data	Storytelling
Can merge skills and approaches (quant/qual)	Agility
Self motivated to expand skills	Curious
Curious, wanting better system level understanding	Curious
Storytelling using data	Storytelling
Openness, accept other experience and expertise	Openness
Assiduous - detail orientated	Organisational intelligence
Excellent understanding of research methods	Agility
Foundational statistical knowledge	Organising collaboration

EXPERIENCES AND INSPIRATIONS:

EDUCATION & EXPERIENCE

- Ethnographic methods
- Qualitative data methods
- Quantitative data methods

- Undergraduate degree in Sociology
- Masters degree in Social
- Research
- A-level in Mathematics
- Background in data

SKILL DEVELOPMENT

- Data presentation
- Proficient in Excel
- Power Point

- Attends lectures, reads articles to maintain current knowledge level
- Received in-house sociology and systematic training

MOTIVATE & SUSTAIN

- Self motivated
- Making a difference
- Future minded

- Genuinely excited b y data and the potential that it offers

PROFILE G: DATA BUSINESS DEVELOPER

Role in Government: Director of Performance and Accountability: City Government

"The focus isn't on data, but on how the applications of data analysis creates value - what is the value proposition"

KEY DUTIES:

- To develop the lab's portfolio of projects on trade and economic impact
- To innovate with data in order to inform new development practice
- To undertake the role of connector within the Programmes Team, ensuring that all teams in the lab were talking to each other to address organisational issues
- Assisting the teams in maneuvering around bureaucratic barriers in order to get things done

ADDED VALUE DEMONSTRATED IN PRACTICE

Changing approach...
In order to develop the organisation's projects in a way that was more in touch with the modern world (specifically around technology), Profile G sought specialist expertise from outside the organisation. By reaching out, he was able to increase his personal understanding and confidence in these new approaches, which he ultimately bought back and implemented into new projects

Manoeuvring around bureaucratic barriers...
To forward the innovation effort, without generating to much resistance from senior levels, Profile G thinks carefully about the incentives of the board members and re-frames the project so that it aligns with their interests and strategic agendas, i.e. demonstrating the value from a low cost/high creativity angle

Growing networks...
Through humility, curiosity and a self awareness of the skills and knowledge that he doesn't yet have, and by having the openness to approach those who do possess them, Profile G was able to reach out to people who had expertise in that area. This enabled him to grow his own personal networks, open doors to more method insights and collaboration possibilities

COMPETENCIES:

Competency	Skill
Drive continuous learning	Curiosity
Can-do action orientated mindset	Focused on outcomes
Sense of agency to change system	Intrapreneur ship
Sees the bigger picture	Focused on outcomes
Horizon scanning - identify positive deviants	Experimental mindset
Align work with stake-holder incentives	Organisational intelligence
Learning by doing mindset	Organisational intelligence
Prototype ideas in cost effective way	Experimental mindset
Awareness raising of potential new methods	Curiosity

EXPERIENCES AND INSPIRATIONS:

EDUCATION & EXPERIENCE

- Good communication
- Relationship management
- Politically aware

- Masters in Public Policy
- Masters Degree in Journalism and Communications
- Has previously worked as a development consultant and innovation specialist

SKILL DEVELOPMENT

- Design Thinking
- Qualitative data methods
- Broad knowledge

- Attends lectures and reads articles to maintain current knowledge level
- Undertook in-house sociology and systematic training
- Attended a Design Thinking Boot Camp

MOTIVATE & SUSTAIN

- Making a difference
- Theoretical inquiries
- Pushing boundaries

- Genuinely excited b y data and the innovation potential that it offers
- Theorises, not learned but more of an intellectual approach

Job profiles from the Government Digital Service

Source: https://www.gov.uk/service-manual/the-team/what-each-role-does-in-service-team

Product manager: job description template

Department: [add detail]

Team: [add detail]

Job family: Product and Delivery

Role: Product manager

Role level: Product manager

Grade: [add detail]

Salary: [add detail]

Profession: The Digital, Data and Technology Profession

Location: [add detail]

Reporting to: [add detail]

About your organisation

[This is your opportunity to 'sell' the role. It's a candidate-driven market so you must make the description of your organisation clear, visionary, exciting and explain the impact the candidate can have both in the delivery of your objectives and society in general.]

Role

A product manager is responsible for the quality of their products. They use their knowledge of user needs and business goals to frame problems and set priorities for their delivery teams.

[Add detail about:

what the participant will work on - be mindful that you might want some flexibility in what the person works on, so mention that in the job description

why the work is important to your organisation

links to blogs or information about the projects]

Main duties

As a product manager, you will:

- form the vision for your product and engage your teams and stakeholders in the development of that vision over time
- keep people informed about the development of your products and promote their uptake
- represent users throughout the delivery process and use their feedback to inform continuous improvement

Skills

- Agile working
- Able to identify and compare the best processes or delivery methods to use, including measuring and evaluating outcomes. Helps the team to decide the best approach. Able to help teams to manage and visualise outcomes, prioritise work and work to agreed minimum viable product (MVP), print and scope.
- Lifecycle perspective
- Recognises when to move from one stage of a product lifecycle to another. Ensures the team is working towards the appropriate service standards for the relevant phase. Able to manage the delivery of products or services at different phases.
- Operational management
- Able to design operational processes for the running and maintenance of products or services throughout their lifecycle. Able to redesign operational processes, amend existing processes, and plan and operationalise the stages of a new product or service development. Is the escalation point for operational issues and can fix complex operational issues. Able to overcome operational constraints to deliver a successful product or service. Works closely with operational delivery teams in DDaT.
- Problem ownership
- Ensures that the right actions are taken to investigate, resolve and anticipate problems. Co-ordinates the team to investigate problems, and implement solutions and preventative measures.
- Product ownership
- Experienced in applying tools, terms and concepts in a variety of ways. Able to be flexible, consider new ways of working and adapt to change.
- Strategic ownership
- Able to get buy-in from the organisation. Able to work with scant information and to articulate that in abstract terms. Able to come up with a strategy.
- User focus
- Able to collaborate with user researchers and can sell or represent users internally. Understands the difference between user needs and desires of the user. Able to champion user research to focus on all users. Can prioritise and defines approaches to understand the user story, guiding others in doing so. Can offer recommendations on the best tools and methods to be used.

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What we offer

[You'd ideally replace some or all of these links with ones more relevant to your organisation. You don't have to use all of the following, but 3 to 5 links will help convey an overview of the DDaT profession in government.]

- The opportunity to work on impactful, meaningful projects
- Small, autonomous agile teams
- The latest technologies, on a large scale
- A diverse and inclusive workplace
- Supportive communities of practice, where you can share and develop your skills and knowledge
- Defined career progression
- Training and development
- Talent programmes
- Flexible working

Application process

[1. Explain what you want in the application - for example, it should be concise, answer the requirements of the role, be limited to a number of pages etc.]

[2. Explain if there are any practical assessment criteria during the application and interview process and work with the relevant head of community or role to define the assessment or test. Tests should be reasonable and relevant to the role.]

[3. List practicalities such as length of role, location etc. Contact your HR team for guidance on this.]

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Delivery manager: job description template

Source: https://www.gov.uk/service-manual/the-team/what-each-role-does-in-service-team

Department: [add detail]

Team: [add detail]

Job family: Product and Delivery

Role: Delivery manager

Role level: Delivery manager

Grade: [add detail]

Salary: [add detail]

Profession: The Digital, Data and Technology Profession (DDaT)

Location: [add detail]

Reporting to: [add detail]

About your organisation

[This is your opportunity to 'sell' the role. It's a candidate-driven market so you must make the description of your organisation clear, visionary, exciting and explain the impact the candidate can have both in the delivery of your objectives and society in general.]

Role

A delivery manager is accountable for the delivery of products and services.

[Add:

- what the participant will work on - be mindful that you might want some flexibility in what the person works on, so mention that in the job description
- why the work is important to your organisation
- links to blogs or information about the projects]

Main duties

As a delivery manager, you will:

- build and maintain motivated teams, making sure there is an iterative plan to work towards
- protect the team and make sure the team collaborates, communicates and focuses on what is most important
- coach team members and others, facilitate continuous improvement and apply the most appropriate agile and lean tools and techniques for their environment
- proactively manage dependencies, overcome obstacles and get the best value against constraints
- potentially manage risks, budgets and people

Skills

Agile and Lean practices

- Able to identify and compare the best processes or delivery methods to use. Able to recognise when something does not work and encourages a mindset of experimentation. Can adapt and reflect, is resilient and has the ability to see outside of the process. Able to use a blended approach depending on the context. Able to measure and evaluate outcomes. Able to help teams to manage and visualise outcomes.

Communicating between the technical and non-technical

- Able to listen to the needs of technical and business stakeholders and interpret them. Able to manage stakeholders' expectations and be flexible, is capable of proactive and reactive communication. Facilitates difficult discussions within the team or with diverse senior stakeholders.

Maintaining delivery momentum

- Able to facilitate the delivery flow of a team, managing the pace and tempo. Able to actively address internal and external risks, issues and dependencies including where ownership exists outside the team.

Making the process work

- Able to identify and challenge organisational processes of increasing complexity and those processes that are unnecessarily complicated. Able to add value and can coach the organisation to inspect and adapt processes. Guides teams through the implementation of a new process.

Planning

- Understands the environment and is able to prioritise the most important or highest value tasks. Able to use data to inform planning. Able to manage complex internal and external dependencies. Able to provide delivery confidence. Able to remove blockers or impediments that affect the plan and is able to develop a plan for difficult situations. Ensures teams plan appropriately for their own capacity.

Team dynamics and collaboration

Able to bring people together to form a motivated team. Able to empower delivery teams. Able to help create the right environment for a team to work in. Recognises and deals with issues. Able to facilitate the best team makeup depending on the situation.

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User researcher: job description template

Source: https://www.gov.uk/service-manual/the-team/what-each-role-does-in-service-team

Department: [add detail]

Team: [add detail]

Job family: User Centred Design

Role: User researcher

Role level: [add detail]

Grade: [add detail]

Salary: [add detail]

Profession: The Digital, Data and Technology (DDaT) Profession

Location: [add detail]

Reporting to: [add detail]

About your organisation

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Role

User researchers plan, design and carry out research activities with users that help teams get a deep understanding of the people that use government services.

Research informs policy, proposition, service, content and interaction design so that services work well for users and achieve their policy intent.

[Add detail about:

what the person will be working on (be mindful that you might want to have some flexibility in what the person works on, so mention that in the job description)

why the work is important to your organisation

Link to blogs or information about the projects.]

Main duties

As a user researcher, you will:

[Insert appropriate text here which summarises the main responsibilities in relation to specific major project(s) on which the person will work.]

Skills

Analysis and synthesis

- Understands how to apply basic techniques for analysis of research data and synthesis of findings. Knows how to involve their team in analysis and synthesis. Can present clear findings that colleagues can understand and use.

Inclusive research

- Understands the diversity of users of government services and the need to make services usable and accessible for everyone. Can work with colleagues to include many kinds of users in appropriate research activities.

Research skills

- Understands and has experience of basic user research methods. Understands when to use those methods and how to apply them correctly. Knows how to involve their team in research activities.

Society and technology

- Understands the social and technological context for government services. Can align user research activities to help their team understand changing user behaviour.

Strategic insight

- Understands what problem the team is trying to solve. Can align user research activities to inform decision making and action.

User centred and agile practices

- Understands and has experience of a range of user-centred practices. Can work with colleagues to plan and do continuous user research in a multidisciplinary team.

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Content designer: job description template

Source: https://www.gov.uk/service-manual/the-team/what-each-role-does-in-service-team

Department: [add detail]

Team: [add detail]

Job family: User Centred Design

Role: Content designer

Role level: [add detail]

Grade: [add detail]

Salary: [add detail]

Profession: The Digital, Data and Technology Profession (DDaT)

Location: [add detail]

Reporting to: [add detail]

About your organisation

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Role

A content designer works on the end-to-end journey of a service to help users complete their goal and government deliver a policy intent. Their work may involve the creation of, or change to, a transaction, product or single piece of content that stretches across digital and offline channels.

They make sure appropriate content is shown to a user in the right place and in the best format. They start from discovery and work closely with user researchers, service designers and interaction designers.

[Add:

what the participant will work on - be mindful that you might want some flexibility in what the person works on, so mention that in the job description

why the work is important to your organisation

links to blogs or information about the projects]

Main duties

As a content designer you will:

[insert appropriate text summarising the main responsibilities of the role]

Skills

Stakeholder relationship management

- Identifies key stakeholders, tailoring communication to their needs, and works with teams to build relationships whilst also meeting user needs. Can take opposing views to reach consensus. Understands how to work with stakeholders and contributes to improving these relationships, using evidence to explain decisions made.

Strategic thinking

- Able to define strategies and policies, providing guidance to others on working in the strategic context. Evaluates current strategies to ensure business requirements are being met and exceeded where possible.

User centred content design

- Able to work autonomously. Creates effective content for digital channels.

User focus

- Identifies and engages with users or stakeholders to collate user needs evidence. Understands and defines research which fits user needs. Able to use quantitative and qualitative data about users to turn user focus into outcomes.

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