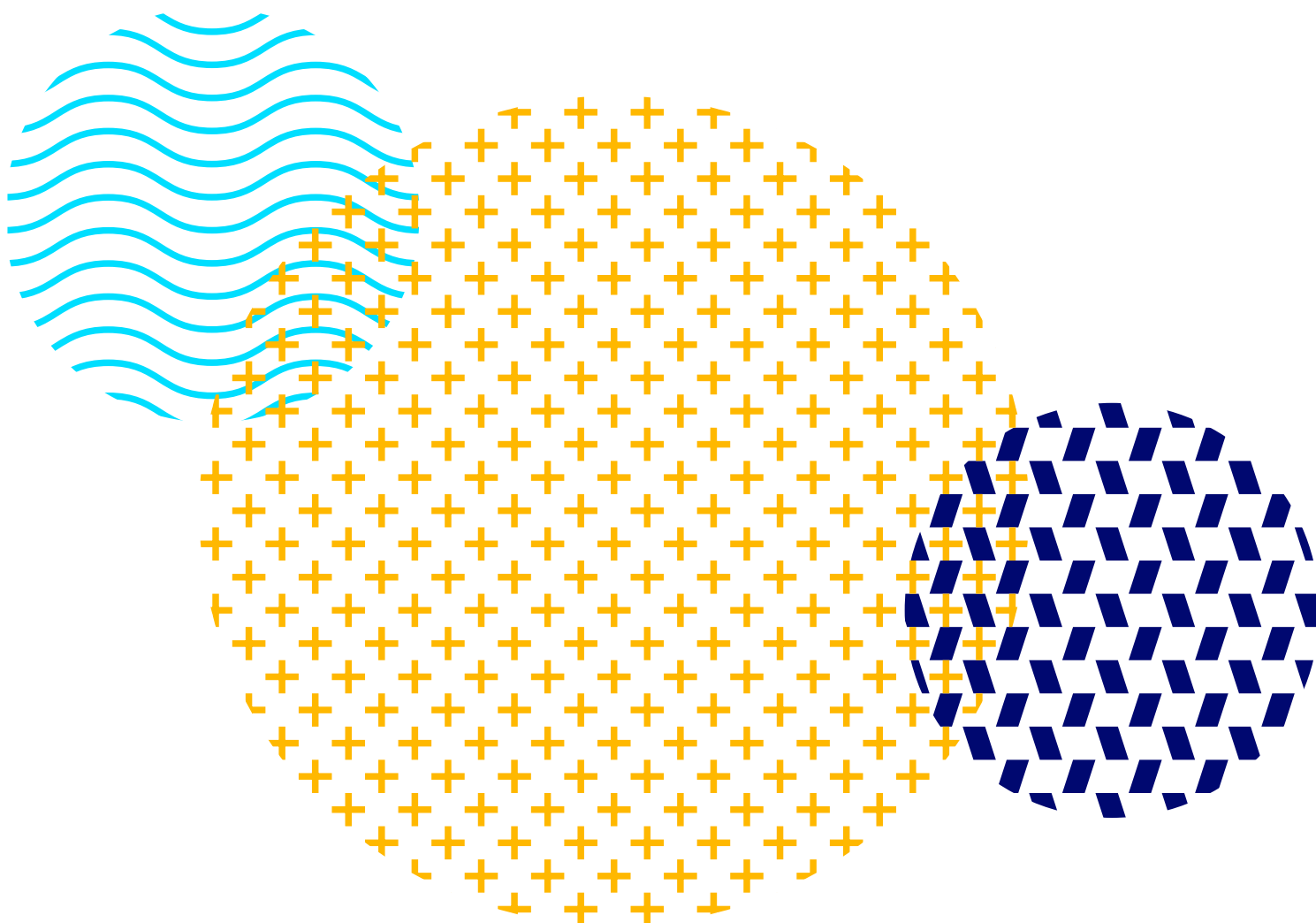


Skills and Competency Framework

Supporting the development and adoption of the Information Management Framework (IMF) and the National Digital Twin



Executive Summary

Achieving the National Digital Twin

Achieving the National Digital Twin (NDT) is an ambitious goal and it will take an incremental, collaborative and transformative approach for it to be successful.

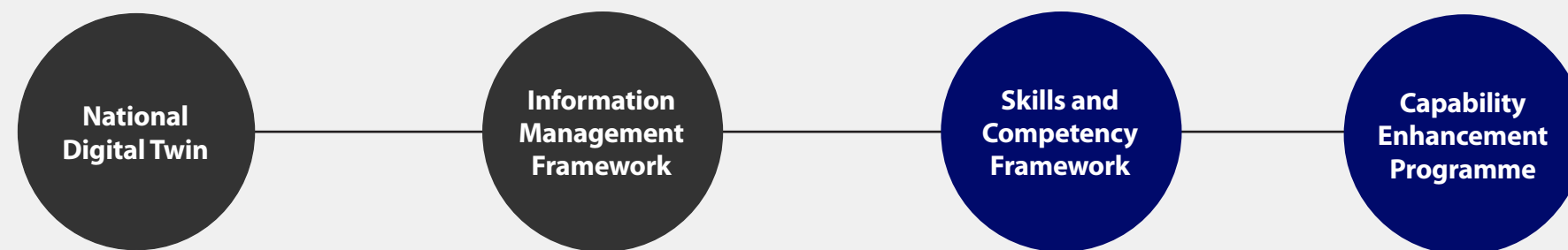
One of the first steps taken is the development of the Information Management Framework (IMF). The IMF aims to drive effective information management across our nation's built environment. The paper '[The Pathway Towards an Information Management Framework](#)' sets out the requirements for the technical core of an IMF that supports secure and resilient exchange, interoperability, integration and linking of data and models across the built and natural environments, at a national level.

The publication of the report by the Centre for Digital Built Britain (CDBB) as part of the Construction Innovation Hub, was a critical milestone towards the NDT. The technical core of the IMF is being developed by the National Digital Twin Programme in collaboration with the Construction Innovation Hub.

If the NDT is about enabling the secure, resilient and reliable integration of connected digital twins in different domains to allow sharing of information, the IMF is both the handbook and rulebook for achieving this. At its heart, the IMF is about promoting consistency, commonality and moving the industry forwards with shared purpose.

What is a digital twin?

A digital twin combines data describing the physical in a digital format. Within the built environment, a digital twin is a realistic digital representation of physical assets, processes and systems.



The goal: Enable the secure, resilient and reliable integration of connected twins in different domains, allowing the sharing of information.

The technical enabler: The handbook and rulebook for developing a language for digital twins to connect and communicate with each other in the context of the NDT.

The people enabler: The skills and roles needed to develop and adopt the IMF to support the ultimate goal of the NDT.
(The focus of this document)

The people enabler in practice: How skills and roles can be developed through training and recruitment.

What is the IMF Skills and Competency Framework?

Skills and Competency frameworks are often used in people transformation and change programmes to identify relevant roles within an industry or organisation, the key skills needed to perform that role successfully and competencies that can be used to assess application of the skill at different experience levels.

At a time when digital disruption is becoming increasingly frequent and the scale and pace of technological change is hard to keep up with, it is important that the skills and roles of the industry are able to adjust and adapt in parallel. This not only applies to changes in technology that are occurring right now, but the changes we are likely to see in the future.

The Skills and Competency Framework presented in this paper, is the people enabler needed to develop and adopt the IMF - a core step in achieving the National Digital Twin. It aims to identify the skills and competencies needed across a range of relevant roles, helping the industry assess and resolve any gaps in skills. Roles do not map to jobs and it is likely that some people will perform a number of roles depending on organisational complexity and level of commitment.

Without this understanding, there is a risk organisations may deploy staff lacking sufficient skills to develop their digital twins, which could lead to erosion of confidence, poorly designed twins which do not support interoperability and connectivity, or failed digital twin projects, with direct economic consequences for organisations.

Accompanying this Framework is a [Capability Enhancement Programme](#) that includes guidance on developing group and individual capability. It includes the practical steps to put the Skills and Competency Framework into practice with learning paths and a training register.

Beyond the Framework

Since 2015, The House of Lords Digital Skills Committee has advocated for greater digital literacy (see appendix) in the UK and has set it as one of its objectives for a Government Digital Agenda. This advocacy is echoed by many built environment institutions such as the Construction Industry Training Board (CITB, 2018) (Unlocking Construction's Digital Future, 2018).

As a key enabler to progressing with our National Digital Twin and becoming a world leader in this field, we need a major concerted effort as a country to establish basic digital literacy in our population - this includes the need to increase [security mindedness](#). This will help us securely collect and manage higher quality data, benefit from new technologies and tools and make better, more informed decisions on how we interact with the world around us.

While national action is needed to promote digital literacy as an enabler to the National Digital Twin and IMF, it is beyond the scope of this Framework.

Using the Skills & Competency framework

As a guide, we recommend the following steps for using this Framework:

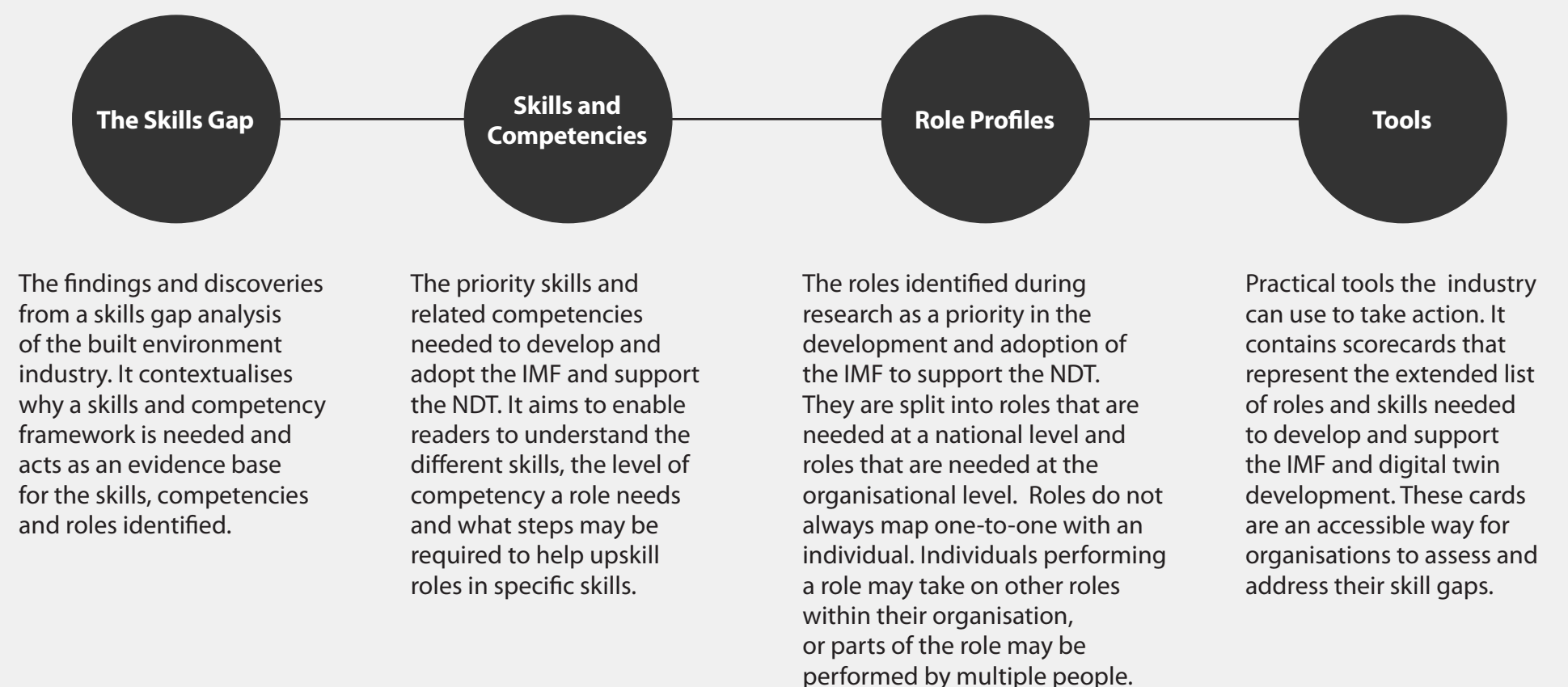
- **Review the Framework**, paying close attention to the roles and skills identified noting that multiple roles can be mapped to one individual or job within your organisation.
- **Set a clear vision and goals** for what you want to achieve with using the Framework – is it to support digital twin ambitions, upskill staff in digital skills and competencies or address organisational capability gaps?
- **Collect existing information** – drawing on existing information you already have within your organisation about roles, skills and competencies.
- **Collect new information** – using the role profiles and competency indicators, interview key people to understand your role and skills gaps.
- **Establish a baseline** – by analysing the information you have collected.
- **Develop a tailored framework** – this is optional depending on whether you want something tailored to your organisation.
- **Review and finalise training plans** – develop your own role-based training plans to close any skills gaps. You may want to use the [Developing a Capability Enhancement Programme](#) publication to support this.
- **Implement a capability enhancement programme** – address gaps by rolling out training plans as part of a wider capability enhancement programme. Use the publication [Developing a Capability Enhancement Programme](#) to support this.

Intended audiences

This Framework is the starting point of a journey to help the industry acquire the skills it needs to develop and implement the IMF and NDT. It is intended to support a diverse set of stakeholders across the built environment, some of whom are outlined below. Specifically it targets potential early adopters of the IMF and digital twins, who can help support the NDT (nationally connected digital twins).



How the Framework is organised



Introduction

Challenges the industry faces

A report The Centre for Digital Built Britain produced named 'The approach to delivering a National Digital Twin for the United Kingdom', refers to critical asset failures as having far-reaching consequences on people and the environment. Specifically it refers to the effects of climate change, population surges and the deterioration of legacy assets.

For example, in a set of floods that struck the north of England in 2015, the Tadcaster bridge in North Yorkshire was taken out of action when its structure became unstable. The bridge failure impacted movement, utilities, communications and power services over a huge area, and fractured a gas main that necessitated the evacuation of hundreds of residents. The information necessary to flag the bridge as flood risks had existed at the time, but it was held in disparate data sets across different organisations, hindering pre-emptive action.

This example speaks to the Institute of Civil Engineers report 'In plain sight' that highlights the industry as fragmented and informed by specialist's who inevitably may not see the integrated picture and interpret assets differently, thereby creating inconsistencies in data and what it means for an asset and the associated risks (ICE, 2018).

"Data can only be truly transformative if we can collect it effectively and, crucially, agree on how we share and use that data to create the best outcomes for everyone. In other words, we all need to be talking the same language."

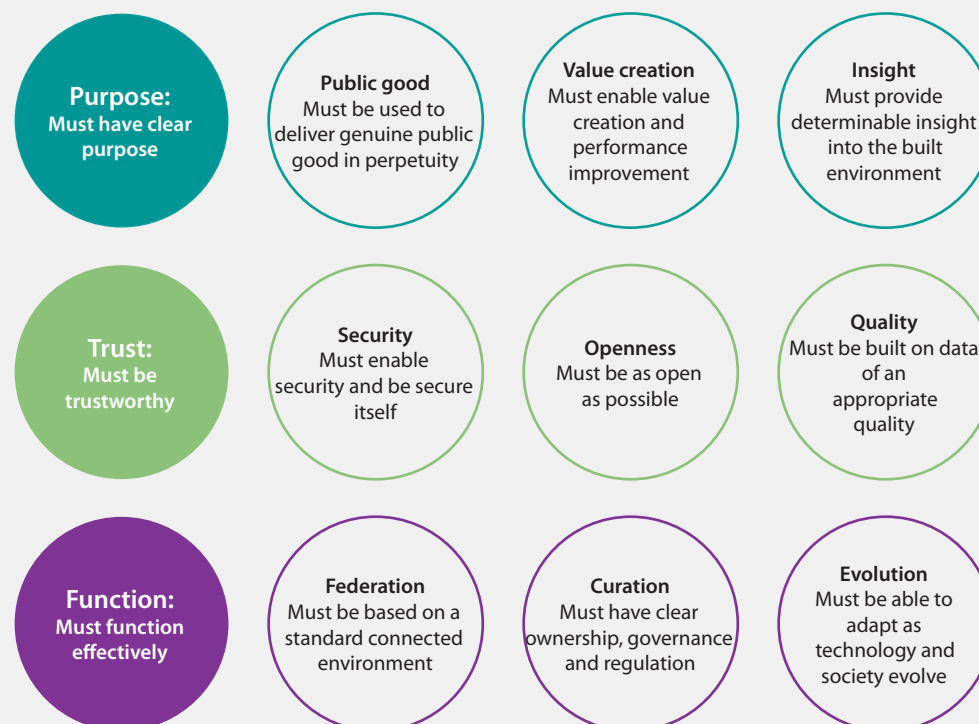
Sir John Armit
Chair, National Infrastructure Commission

A brighter future for public good

Given these challenges, The Centre for Digital Built Britain (CDBB) has made data sharing for the public good a centrepiece of the National Digital Twin Programme. The National Digital Twin (NDT) is the idea of having a connected ecosystem of digital twins which share data that benefits industry and wider society through enhanced decision making and whole life optimisation across the nation's built environment. You might think of it as the 'internet for infrastructure', by which we mean a connected network of systems able to speak the same language and share information consistently, securely and at speed.

Focusing on how we manage systems of infrastructure across the built and natural environment, the vision of the NDT Programme is guided by the Gemini Principles and the protocols by which they can be integrated securely and resiliently to create a data-led approach to decision making. (Bolton et al., 2018)

The Gemini Principles



Better outcomes for human flourishing

By taking a data-led approach, driving an industry culture for improvement and learning, and following the Gemini Principles, we can achieve a National Digital Twin, unlocking a host of benefits for:

Our Nation

Where our infrastructure systems and assets speak to each other allowing us to find new and improved ways to manage them.

Our Communities

Where society is enabled and empowered by world class infrastructure, understanding what makes communities prosper and how to nurture prosperity in less fortunate ones.

Our Environment

Where we can compare environmental data between cities, to gain greater insight into performance against goals and targets, leaving a lasting legacy for generations to come.

Our Economy

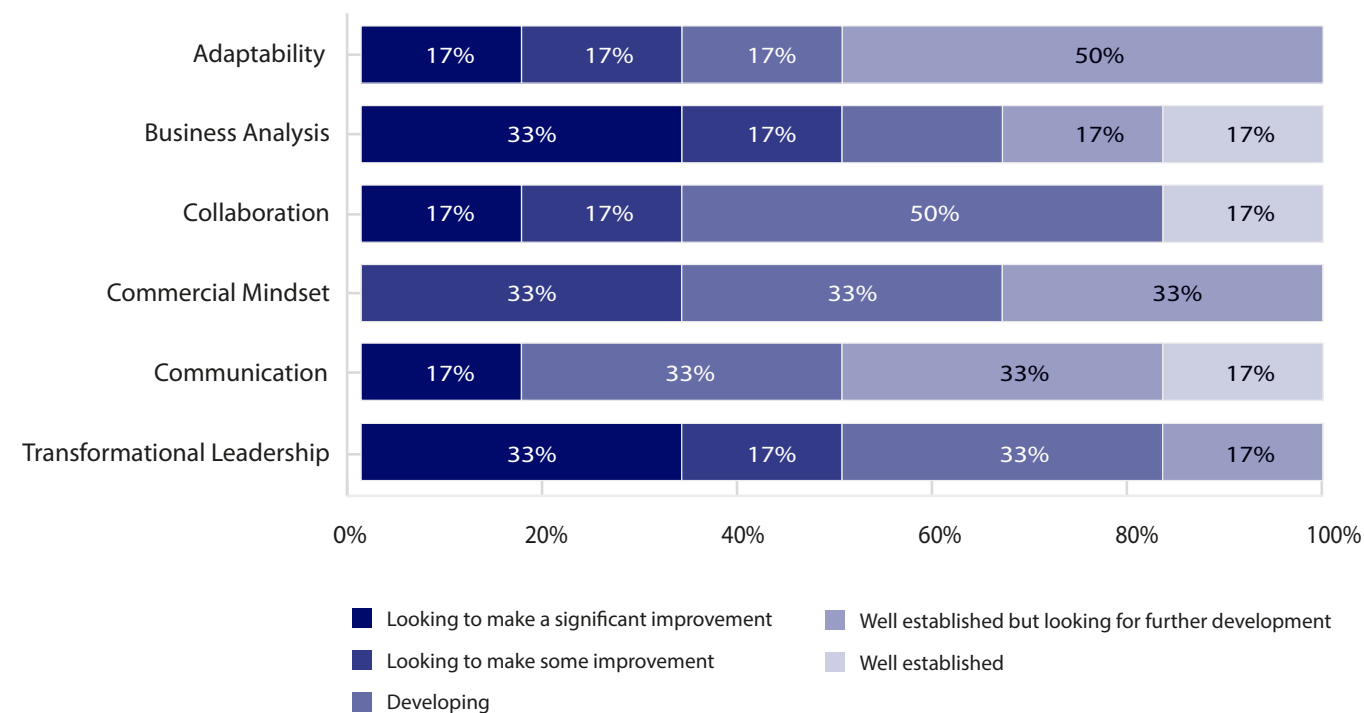
Where asset management and maintenance is predictive instead of reactive, helping us reduce risks, become more efficient and generate ever greater value out of our assets.

"An effective Digital Built Britain must not be solely focused on the technical and physical aspects, but it will also need to carefully consider the societal impacts."

Pathway to an Information Management Framework

The Skills Gap

Business Skill Areas



When recommending priority skills and competencies to develop and adopt the IMF and NDT it is important to consider the context in terms of where gaps in roles and skills currently exist within the industry. To do so, a series of interviews were held with representatives of built environment organisations of different sizes, training bodies and local councils. The aim was to discover the level of current competency in relation to skills and roles needed to adopt the IMF.

Key feedback from interviewees

Business Skill Areas

Transformational Leadership is critical for the success of the IMF and National Digital Twin. Leaders do not need to have a depth of technical literacy but do need to recognise the opportunity and benefits that data and data sharing provides. This is a skill area where there appears to be a significant skills gap at both organisational and national levels. Nationally, this is around the ability to articulate the benefits of the NDT in terms that organisations can understand and engage with, and appropriately incentivise organisations to adopt the IMF. At the organisation level, senior leaders such as CEOs and CIOs who play a critical role in cultural transformation, are starting to understand the value of data but struggle to quantify the benefits and develop a clear narrative to drive better practices across their organisation.

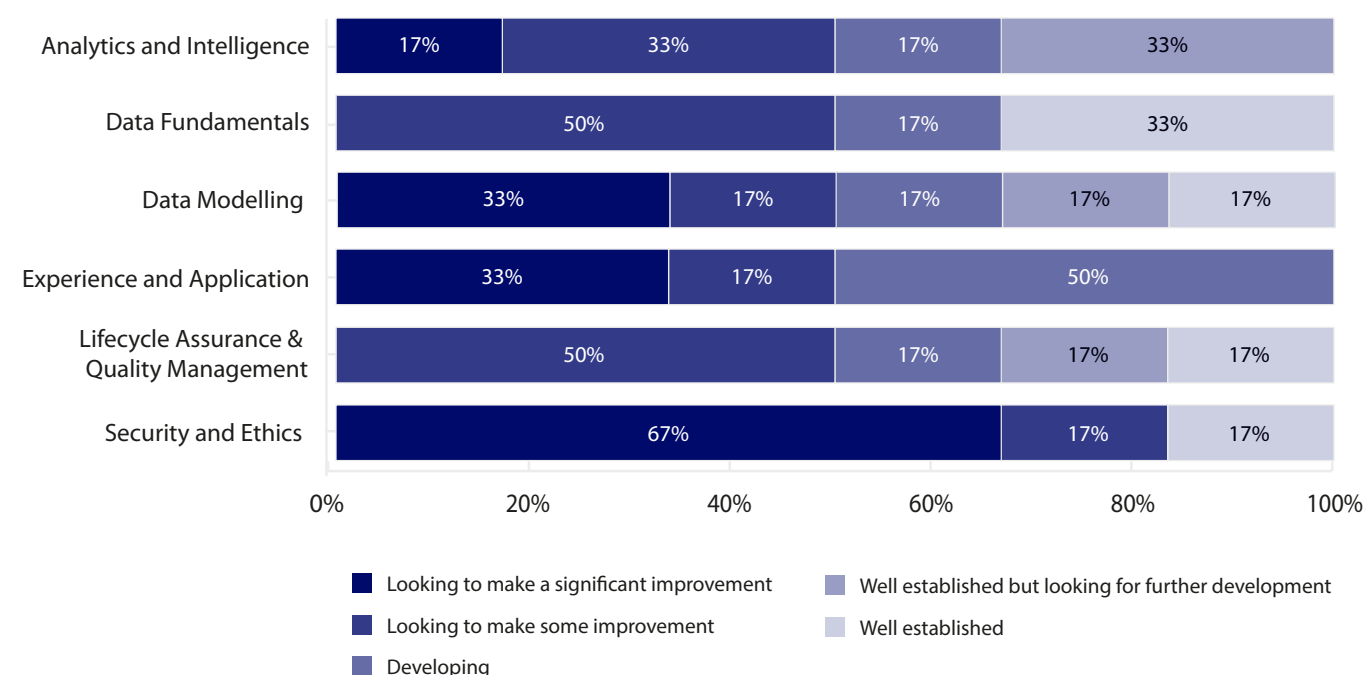
Collaborative data sharing within organisations is in some cases limited by protectionism, and a lack of awareness that pre-existing data already generated could have a further use elsewhere and therefore be re-purposed. Common barriers to inter-organisational sharing were cited as competition, intellectual property and data security concerns.

The communication challenge is creating a common language and translating digital concepts into words and stories that everyone can understand. The barriers to digital literacy can be high if experts and practitioners use jargon terms and technical concepts without trying to take others on the journey by starting with basics and putting it in terms and context they can relate to.

Organisations reported a lack of adaptability and willingness to change, and quiet resistance anchored to old mindsets. Some organisations have made significant progress, but this is not consistent across the board, and in some cases has been forced upon organisations rather than something that was designed, planned and cultivated.

Understanding the commercial value of data and the importance of quality data to making informed commercial decisions was not consistent.

Technical Skill Areas



There appears to be a skills gap in the ability to develop robust business cases using accurate and up to date evidence, with some organisations tending to rely on intuition over insight. Some examples of an effective commercial mindset were found helping to shift the culture in organisations e.g. use of proof of concepts to show the relationship between quality information and KPIs used to assess the effectiveness of the business.

Business analysis activity tends to be undertaken at a functional level rather than enterprise wide, and therefore analysis of the data and requirements generated may only cover a small subset of organisational requirements. Organisations are also finding it difficult to balance investments to address short term challenges with longer term investments in capability, meaning business objectives analysis can be skewed towards a narrow set of priorities which clashes with long term.

Digital Skill Areas

Data Fundamentals is a priority skill for all individuals in an organisation to develop, but was seen as developing rather than established. Evidence of this existed in pockets throughout organisations but a general level of digital literacy and security mindedness was a key development area.

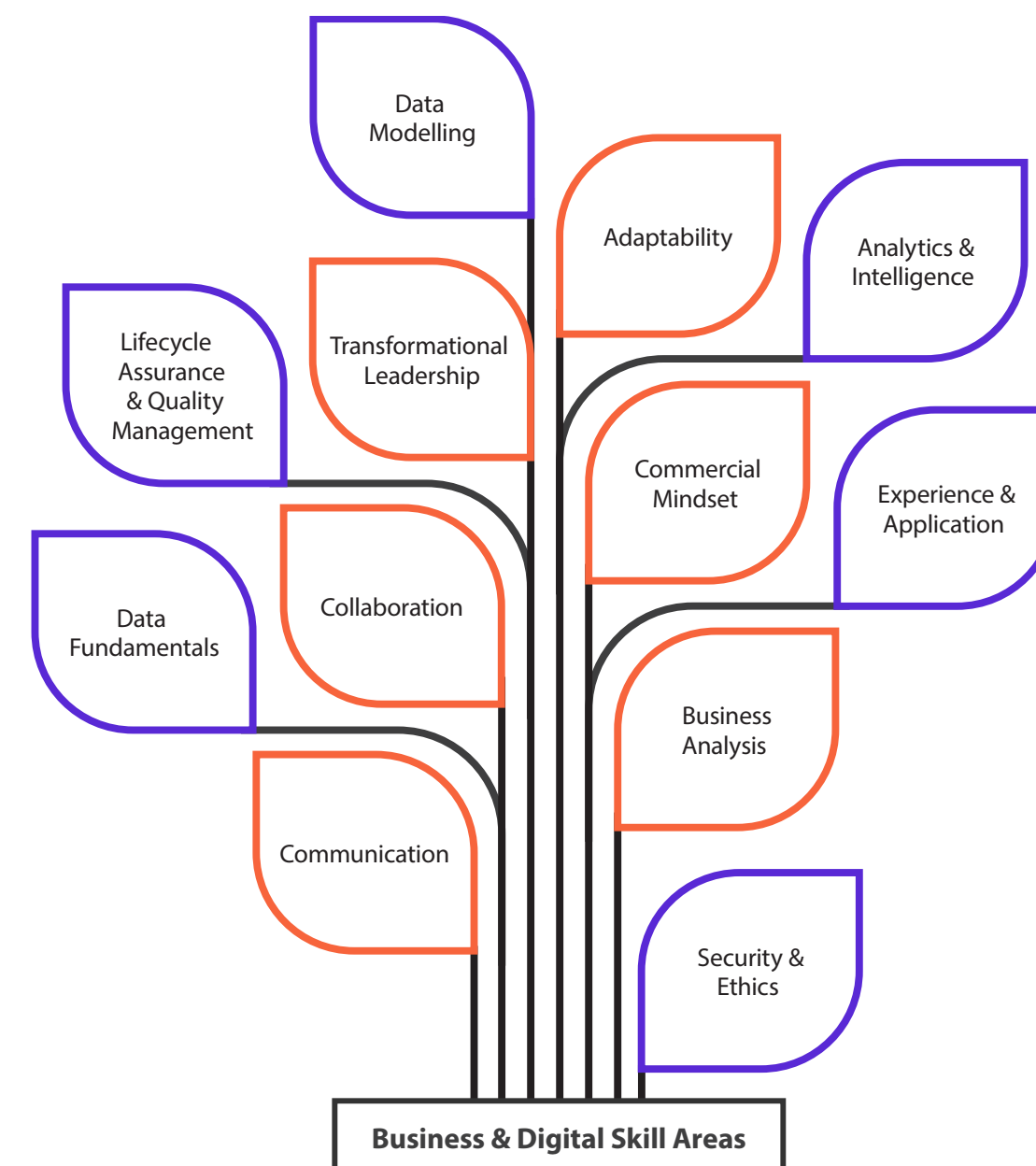
There is still a lack of ownership outside of specified data roles. Most organisations struggle to connect the lifecycle of data with the lifecycle of a process, often viewing them as mutually exclusive when they are heavily interwoven and dependent on each other for benefits to be realised.

With Data Modelling, we found organisations have a tendency to be technology-led rather than data-led. Where architecture has evolved over time, data tends to be held in silos which restricts ability to model data at an enterprise level. This is further compounded when organisations try to share data across organisation boundaries.

There was a fairly inconsistent picture emerging with regards to Analytics and Intelligence. All organisations see the value in this skill area and are focusing on this, but some are jumping straight to analytics, visualisation and reporting without taking the time to focus on data quality, which can lead to lack of trust. As one interview put it they are “making progress, but built on shaky data and practices”. Some organisations have started to explore prescriptive analytics, machine learning and artificial intelligence, but these are very much emerging areas with limited capability currently in place.

User Experience and Application is a critical skillset in need of significant development to promote better adoption of technology by focusing on intuitive and accessible design that meets user needs. Few people are ‘trained’ in this skill and tend to acquire knowledge by doing, which means practices are not always consistent and do not always account for subtle differences in user’s needs.

Security and Ethics is an area of increasing importance and a priority for all organisations as they attempt to move towards common approaches to data sharing and run into barriers in terms of protectionism, confidentiality and security. Specifically, organisations need to increase their security mindedness capability if they are to have secure, resilient data gathering, processing, sharing and storage.



Gap Analysis (Roles) – Evidence from stakeholder interviews

Benefits Manager

Some organisations are still struggling to understand the value of the IMF and NDT. The long timescales of the programme also lead to it not being prioritised when set against short term challenges. The Benefits Manager role at a national level would help identify use cases, case studies and focus on incentivisation for organisations thinking about adopting the IMF. Benefits in this context, are not just in terms of revenue generated, but efficiency, time savings and waste reduction.

Ontologist

This is seen as critical for collaboration between organisations, and establishing a common way for structuring and sharing data using consistent terms with consistent meaning. It is not necessarily needed at an organisation level, as it can be incorporated into other data and architecture roles. The need for a series of people who understand taxonomies and ontologies is recognised as critical for the NDT. If this role is not in place at a national level, there is a risk organisations and sectors will develop digital twins that are not interoperable and cannot be connected.

Data Regulator

To support the National Digital Twin and safeguard data for the public good, a role is needed to maintain the integrity and quality of data being fed into the twin, and the integrity with which the NDT is used. The regulator also needs to be an active driver of data ethics, setting out the regulatory framework to maintain security, reduce the risk of illicit or immoral practices, maintain confidentiality and data privacy, to ensure transparency and trust.

Data Consumer

As one interviewee put it, “we have thousands of data consumers across our organisation”, but not everyone identifies with this role and the responsibilities that come with it. Often data is viewed as something managed and dealt with by digital or IT teams, but in reality people at all levels and across all parts of an organisation use data every day to make decisions. Shared accountability needs to be promoted so that people take ownership for assessing the quality of the data they use, and the way in which they manage it.

Data Leader

Views on this role vary considerably. Some interviewees felt there were “too many data leaders”, while others believe it is the biggest gap. In some organisations there is good bottom up leadership being shown among data and digital enthusiasts which is not reflected at a senior level. For other organisations, there is no clear leadership which leads to unclear messaging and no clear direction of travel. Data Leaders should consider digital twin development as a fundamental change in culture that is needed by more than just one function. Clear alignment is needed between the Business and IT.

Data Producer

As with data consumer, interviewees felt every person in the organisation could be described as a Data Producer. What is lacking and where the gap is, is the recognition that this is a role they are fulfilling and the responsibilities that come with it. This includes making sure data collected is of the right type and quality, and is consistent with organisation standards and policies. Above all, it is important for Data Producers to be aware of the flow of data (the data lifecycle) – why am I collecting this data? Where does it go? Who will use it? How will it be used? What is the benefit? Why does quality matter?

Data Steward

Most people interviewed felt this role was not commonplace enough. According to one interviewee, Data Stewards are needed as well as better stewardship of data in general. For some there were no obvious people performing this as a defined role but many people performing elements of it as part of another role. Linked to this, the role is often picked up by enthusiasts, who do not always have a clear remit and lack top down strategic direction through policies and standards, leading to data silos. They are also usually not working with clear metrics for assessing information management maturity.

User Researcher

This is an emerging role sometimes picked up by change managers but requiring a slightly different skillset with a clearer link to technology. This was seen to be a critical, yet often under appreciated role, in ensuring the adoption of new technologies and ways of working. Pockets of user research appear to exist in most organisations spoken to, however some felt it was viewed as a nice to have rather than a necessity. Others felt their own user researchers had a habit of asking the wrong questions – what users want instead of what they need.

Data Governance Specialist

This role was often mistaken for being a legal or audit function, primarily focused on data privacy regulation. Organisations did not always equate data governance with the creation of policies and standards to govern its collection, management, use and sharing. Few organisations had someone fulfilling this role. Where data governance specialist are in place, they do not always interact effectively with data custodians, responsible for the transportation and storage of data. This was a message repeated by most interviewees.

Skills and Competencies

Business and Digital Skill Areas

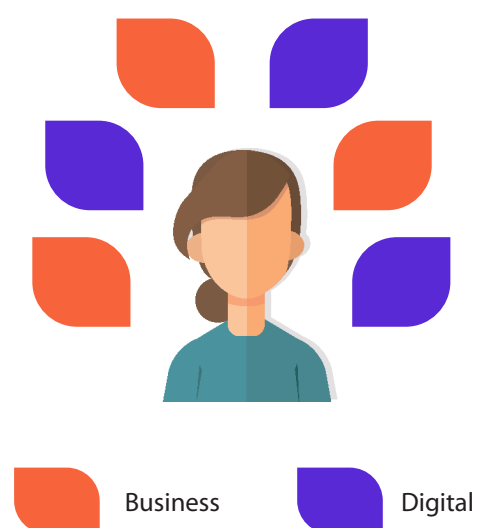
This section of the Framework is split into sets of business and digital skill areas. These are the priority skills needed to develop and adopt the IMF and support the NDT – both skillsets are equally important and are aimed at improving decision-making with better quality data.

Business skill areas cover the soft or non-technical skills. They include how you interact with colleagues, how you solve problems and manage your work.

Digital skill areas cover hard or technical skills. They relate to the training or experience you have.

To understand the level of skill a person has, competencies are measured using a set of competency indicators, which are descriptions of the skill in practice.

Whilst business and digital skills are represented separately, every role needs the right mix of both to be successful.



How we measure skill levels

Four levels of competency are used in this Framework: Awareness, Working, Practitioner and Expert. These are the UK Government standard for identifying and categorising the level of digital skills a person has.

Competency indicators

Awareness

You know about the skill and have an appreciation of how it is applied in a practical situation.

Working

You can apply your knowledge and experience of the skill, including tools and techniques. You can adopt those most appropriate for the situation.

Practitioner

You know how to share your knowledge and experience of this skill with others, including tools and techniques. You can define those most appropriate for the situation.

Expert

You have both knowledge and experience in the application of this skill. You are a recognised specialist and adviser in this skill including generation of new practices, methods and tools. You can lead or guide others in following best-practice.

Priority skills needed to develop and adopt the IMF to support the NDT

Adaptability

- Continuous improvement
- Embracing innovation
- Personal resilience
- Scenario planning

Business Analysis

- Analysing information to make decisions
- Calculating risk/reward ratio
- Process and workflow mapping
- Requirements definition

Collaboration

- Building trusting relationships
- Developing shared goals
- Sharing and resharing the right data
- Working with others

Commercial Mindset

- Developing strategy and plans
- Identifying use cases
- Taking an enterprise view
- Writing business cases

Communication

- Active listening
- Influencing
- Story telling
- Translating technical jargon into everyday language

Transformational Leadership

- Championing the value of a quality improvement culture
- Creating a vision and sense of purpose
- Developing and empowering others
- Driving ownership and accountability

Analytics & Intelligence

- Analytics tools and techniques
- Data requirements
- Statistical analysis
- Visualisation and sense-making

Data Fundamentals

- Data collection and management
- Data literacy and security mindedness
- Generating value from data
- Making decisions with data

Data Modelling

- Ontology
- Taxonomy and semantics
- Reference data
- Systems architecture and integration

Experience & Application

- User interface design and accessibility
- User requirements and experience
- User research methods and techniques
- User testing

Lifecycle Assurance & Quality Management

- Data validation
- Information requirements and governance
- Quality analysis and improvement
- Process modelling

Security & Ethics

- Business Continuity
- Cyber Security
- Data Privacy
- Legal

Business Skill Areas

Summary

These are the priority business skill areas needed to develop and adopt the IMF and support the NDT. They are characterised and specifically defined in relation to that purpose. They have been developed through stakeholder engagement with subject matter experts an assessment of the current and future industry skills gaps.

Each skill combines a series of complimentary competencies that are explained in more detail through their indicators on the following pages of this Framework.

Definitions

Adaptability

Adopts a learning mindset to continually innovate and develop agile skills, demonstrates resilience in the face of setbacks and resistance to change.

Business Analysis

Monitors, analyses, evaluates and interprets data to create useful information to solve problems; understanding and managing the risk/reward ratio and operating within an ethical code of conduct.

Collaboration

Builds trusting relationships to maximise the value of data and what is shared (data and accompanying models and standards), recognising the broader impact of interoperability of data assets.

Commercial Mindset

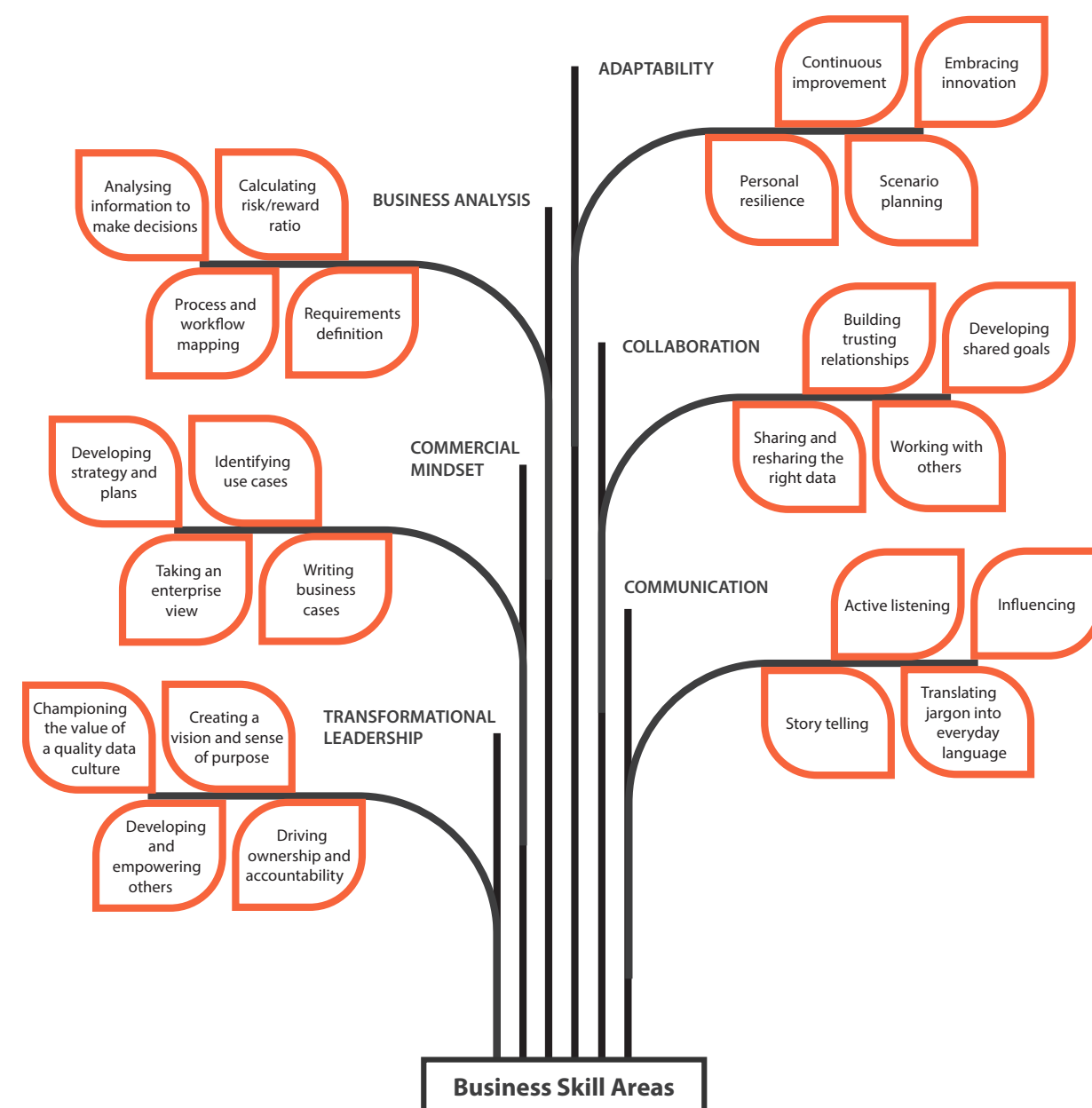
Demonstrates an understanding of commercial decision points and key performance indicators, being able to build a business case for where data management and sharing could drive better commercial outcomes including financial and societal gains.

Communication

Listens effectively to others to understand data management challenges and data requirements, and articulates clearly and compellingly the case for better information management and better quality data in order to secure organisational commitment.

Transformational Leadership

Appreciates and champions the value of data and digital assets and their importance to fulfil real world purpose and the vision of the NDT. Driving cultural change by empowering self and others to change their mindset and approach.



Business Skill Area

Definition and competency indicators

Adaptability

Definition

Adopts a learning mindset to continually innovate and develop agile skills, demonstrates resilience in the face of setbacks and resistance to change

Research showed a consistent lack of willingness to change and adapt with quiet resistance anchored to old mindsets.

Feedback from gap analysis

Awareness



- Reflects on own experiences and draws out lessons learned.
- Anticipates personal challenges and plans ahead to navigate them.
- Shows persistence and bounces back quickly from setbacks.
- Thinks outside the box in order to access more innovative ideas.

Working



- Drives continuous improvement across their teams processes, facilitating knowledge sharing.
- Anticipates team challenges and plans ahead to navigate them.
- Understands own motivations and drivers and also those of others in the team.
- Encourages and cultivates innovative ideas within the team.

Practitioner



- Creates opportunities and forums for people to share knowledge and ideas across the organisation.
- Anticipates organisational challenges and plans ahead to navigate them.
- Builds motivation for improvement across the organisation.
- Facilitates and promotes innovative ideas across the organisation.

Expert



- Drives a continuous learning culture within the organisation or national institution.
- Creates resilient strategies and operations.
- Creates a safe environment where others can talk openly about personal strengths and development needs in order to improve.
- Champions innovation across the organisation and/or nationally.

Business Skill Areas

Definition and competency indicators

Business Analysis

Definition

Monitors, analyses, evaluates and interprets data to create useful information to solve problems; understanding and managing the risk/reward ratio and operating within an ethical code of conduct.

“We helped to shift the data culture by developing a number of Proof of Concepts and streamlining enterprise KPIs.”

Feedback from gap analysis

Awareness



- Separates information into component parts, patterns and relationships.
- Probes for further information or greater understanding of a problem.
- Produces workable solutions to a range of basic problems.
- Represents data in a truthful way, without misleading others.

Working



- Demonstrates competence in the use of analytical tools and technology to analyse data.
- Demonstrates an understanding of how one issue may be part of a much larger system.
- Produces workable solutions to more complex team problems.
- Helps to educate others on the importance of data ethics in relation to data manipulation.

Practitioner



- Applies specialist and detailed technical expertise to analyse organisational data.
- Shows ability to identify common themes and core issues across the organisation.
- Produces workable solutions to complex organisational problems.
- Calculates and advises on risk/reward ratio of investment in data analysis and sharing.

Expert



- Analyses a broad range of organisational and industry data using advanced technological tools.
- Identifies common themes and underlying core issues at industry/societal level.
- Produces workable solutions to complex societal problems.
- Makes strategic decisions based on the risk/reward ratio of data analysis and sharing to gain win/win outcomes.

Business Skill Area

Definition and competency indicators

Collaboration

Definition

Builds trusting relationships to maximise the value of data and what is shared (data and accompanying models and standards), recognising the broader impact of interoperability of data assets.

Barriers to collaboration include protectionism and a lack of awareness of who and how to collaborate.

Feedback from gap analysis

Awareness



- Invests time to understand the day-to-day work of others and how it fits the overarching vision and purpose.
- Collaborates with others outside of their immediate team and at different levels in the organisation.
- Records data in a way that can be shared more widely, having the needs of others in mind.
- Builds trusting relationships with others in the team.

Working



- Invests time to understand the needs and objectives of other teams in the organisation.
- Collaborates across teams, sharing data in order to enhance team decision making.
- Shares and cascades relevant information across departments.
- Builds trusting relationships across other teams.

Practitioner



- Invests time to understand cross functional objectives, KPIs and how they interrelate.
- Collaborates cross functionally with the big picture in mind to enhance strategic decision making.
- Encourages and facilitates the sharing of data cross functionally to optimise decision making.
- Builds trusting relationships across the entire organisation.

Expert



- Invests time to understand objectives of external stakeholders and identifies common needs and challenges.
- Collaborates with other organisations/national institutions, sharing data to derive greater value and make strategic decisions, having the national interest in mind.
- Role models a culture of openness and sharing within the organisation.
- Builds trusting relationships both organisationally and nationally.

Business Skill Area

Definition and competency indicators

Commercial Mindset

Definition

Demonstrates an understanding of commercial decision points and key performance indicators, being able to build a business case for where data management and sharing could drive better commercial outcomes including financial and societal gains.

Commercial decisions are driven by the need for cost reduction and greater efficiency but there is inconsistent realisation of how fit-for-purpose data can directly impact waste reduction and create efficiencies.

Feedback from gap analysis

Awareness



- Understands commercial KPIs for own role and team.
- Identifies opportunities and sources the right quality data to drive commercial decisions in own role.
- Shows ability to create a simple business case for where better-quality data is needed in own role.

Working



- Understands commercial KPIs for different teams across the business.
- Identifies user opportunities and sources the right quality data to drive effective decisions across teams.
- Shows ability to create a business case for where better-quality data is needed.
- Demonstrates a strong understanding of commercial strategy and how it informs digital twins and the NDT.

Practitioner



- Contributes to setting commercial KPIs for the entire business.
- Identifies user opportunities and sources the right quality data to drive effective decisions across the organisation.
- Shows ability to create a complex business case for where better quality data is needed.
- Demonstrates and clearly articulates a strong understanding of commercial strategy and how it contributes to the NDT.

Expert



- Fully understands the organisation or industry's operating environment and shapes commercial KPIs organisationally or nationally.
- Identifies user opportunities and sources the right quality data to drive commercial decisions for the national interest.
- Champions the business case for better quality data management within and outside the organisation or institution.
- Develops commercial strategy that supports the NDT (on both an organisational and national level) with clarity and conviction.

Business Skill Area

Definition and competency indicators

Communication

Definition

Listens effectively to others to understand data management challenges and data requirements, and articulates clearly and compellingly the case for better information management and better quality data in order to secure organisational commitment.

“We have woken up to the importance of data. People are highlighting challenges. However, most of what we do is still based on poor quality data. We don’t know half of the challenges that really exist.”

Feedback from gap analysis

Awareness



- Shows awareness of own personal bias around data sharing.
- Shows awareness of the benefits of quality data to inform better decision making.
- Describes current data management limitations to manager.
- Communicates strengths and limitations of technology across working groups.

Working



- Listens to understand the specific data challenges within their team.
- Shares best practice with other business units and across industry.
- Communicates a compelling story to their team as to the need for better quality data management.
- Articulates key data management challenges to department head/function.

Practitioner



- Listens and shows understanding of specific data challenges within their department or function.
- Communicates courageously upwards on the limitations of current data management and shares best practice.
- Opens a dialogue with others in the business to understand what information they need to do their jobs.
- Articulates the strategy using a compelling story to influence others on the needs of their department or function.

Expert



- Listens deeply to understand specific business and technical challenges within and across organisations.
- Influences key stakeholders at c-suite and national level by promoting understanding on how quality data leads better and more informed decision-making.
- Translates the technical concepts of the IMF into practical, accessible language with minimal use of technical jargon.
- Tells a powerful story of the “Why” for digital transformation with passion and authenticity, using a variety of styles to maximise impact on the audience.

Business Skill Area

Definition and competency indicators

Transformational Leadership

Definition

Appreciates and champions the value of data and digital assets and their importance to fulfil real world purpose and the vision of the NDT. Driving cultural change by empowering self and others to change their mindset and approach.

“We have now reached a tipping point where digital assets secure equal investment to physical assets and leaders need to recognise and communicate this.”

Feedback from gap analysis

Awareness



- Demonstrates awareness of the need for quality data and how the process lifecycle impacts this. Is able to relate this to the broader organisational strategy and vision for digital twins and the NDT.
- Understands and holds themselves accountable to the guidelines and protocols that govern the management of data.
- Shows insight into own personal strengths and development areas related to digital evolution and change.
- Proactively develops own skills related to digital transformation.

Working



- Translates the national/organisational vision for their team, gaining buy-in.
- Facilitates understanding and holds their team to account on the guidelines and protocols that govern the management of data.
- Works with other team members to help them understand strengths and development areas related to digital evolution and change.
- Coaches, mentors and develops the skills related to digital transformation in the team.

Practitioner



- Translates the national/organisational vision across the business/national institution, gaining buy-in.
- Empowers others to hold their teams to account on the guidelines and protocols that govern the management of data.
- Identifies strengths and skill gaps within the organisation/national institution related to digital evolution and change.
- Facilitates the development of identified skill gaps e.g. through sourcing appropriate scalable programmes or resources.

Expert



- Creates a vision grounded in real world purpose at national/organisational level with clear goals which support everyone to understand and achieve the wider strategy of a digital twin and NDT.
- Champions the guidelines and protocols that govern the management of data and empowers everyone to take responsibility for these.
- Analyses current and future trends to proactively identify future talent needs for the business/national institution and puts in place plans to build capabilities required.

Digital Skill Areas

Summary

These are the priority digital skill areas needed to develop and adopt the Information Management Framework and support the National Digital Twin. They have been developed through stakeholder engagement with subject matter experts an assessment of the current and future industry skills gap.

Each skill combines a series of complimentary competencies that are explained in more detail through their indicators on pages 16 to 21.

Definitions

Analytics and Intelligence

Is able to specify quality requirements needed of data being produced and analysed. Can structure and analyse data using statistical analysis and other data science methods to inform data comprehension. Uses visualisation and sense-making techniques to improve data interpretation and aid decision-making.

Data Fundamentals

Demonstrates the ability to create, use and communicate data in context. Articulates an understanding of data definitions and methods (data literacy). Knows what good quality data looks like and can articulate the purpose and value of using it, whilst recognising how to generate value and make decisions with it.

Data Modelling

Takes a systems-thinking and logical approach to plan, design, manage and optimise the flow of data, demonstrating clear understanding of engineering semantics such as ontologies, associated taxonomies and reference data. Recognises these concepts in relation to their broader impact on data sharing, interoperability and connected digital twins.

Experience and Application

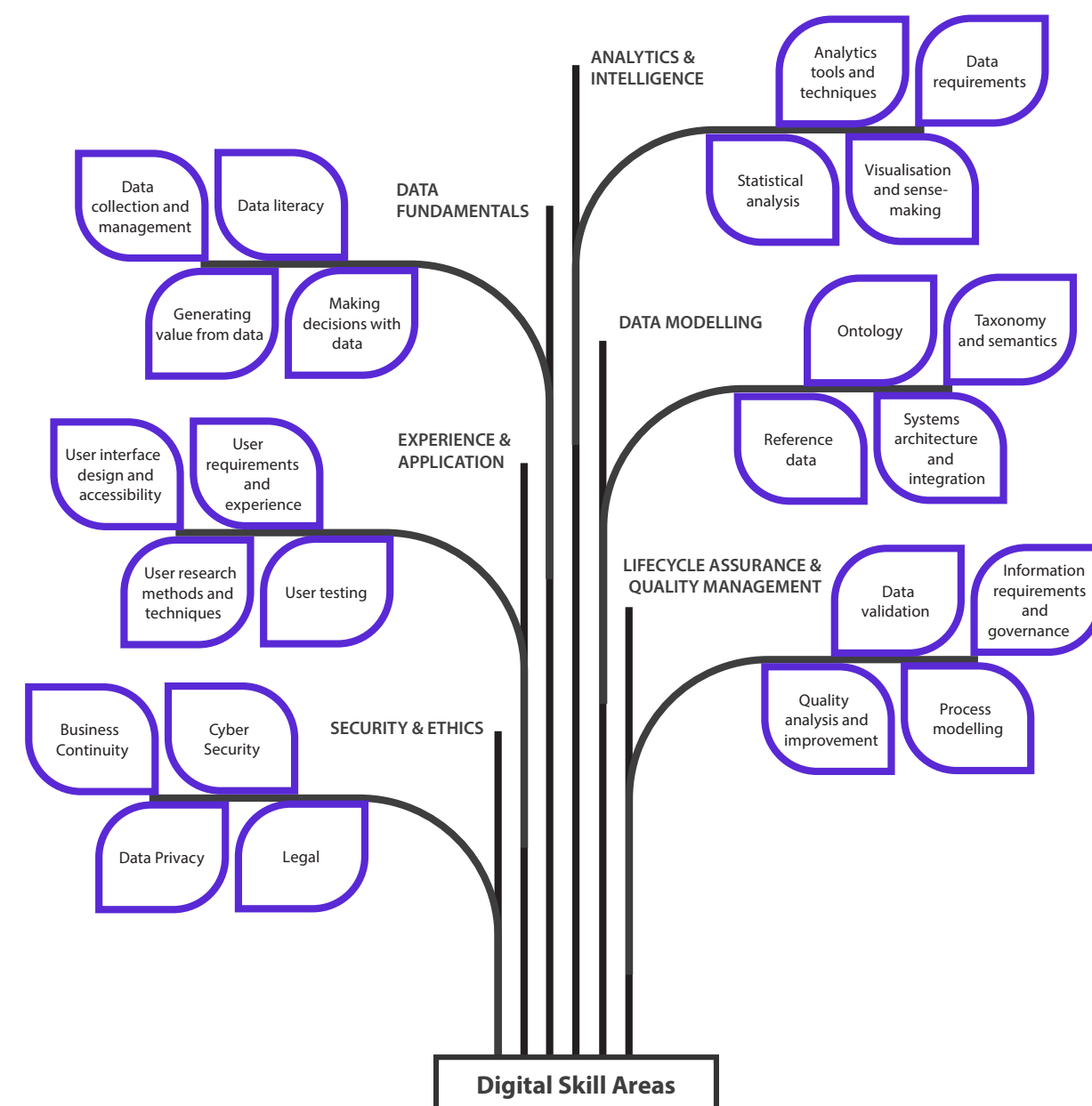
Crafts intuitive and engaging user experiences through user research and testing. Demonstrates an understanding of user interface design, facilitation and people to bridge the gap between data, technology and users - making technology more applicable and accessible.

Lifecycle Assurance & Quality Management

Understands how the relationship between lifecycle management, process modelling and data quality informs information requirements and data quality improvements. Embodies a quality improvement culture with targets to build trust and transparency of the processes and outcomes associated with data including its value and purposeful fit for informed decision-making.

Security and Ethics

Acts as a governing and compliance authority to inform how data is used. Embodies a secure by design approach to cyber security, promoting security mindedness and business continuity. Considers data decisions in context of business integrity and ethics whilst ensuring data privacy and legal obligations are adhered to.



Digital Skill Areas

Definition and competency indicators

Analytics & Intelligence

Definition

Is able to specify quality requirements needed of data being produced and analysed. Can structure and analyse data using statistical analysis and other data science methods to inform data comprehension. Uses visualisation and sense-making techniques to improve data interpretation and aid decision-making.

These skills tend to be specific to a very specialist group of people. This makes it challenging for leadership to recognise their value and insight into the lifecycle process to aid informed decision-making with better quality data.

Feedback from gap analysis

Awareness



- Awareness of what good quality data looks like in relation to its ability to be analysed and inform decision-making.
- Knowledge of mathematical and statistical techniques for analysing data.
- Awareness of how to use scientific methods to manipulate data when running analyses, including extrapolation and regression.
- Has knowledge of different mediums used to convey information (e.g. reports, visualisations, dashboards).

Working



- Demonstrates the ability to define requirements of good quality data to support their analysis.
- Experience using statistical, practical and ethical methods to analyse data across different data sets.
- Demonstrates the ability to follow data modelling principles when transforming and analysing data and can do so with different data sets.
- Demonstrates the ability to draw insight from data in the form of visual communication that users are receptive to.

Practitioner



- Actively engages others to build an understanding on the quality requirements of data being produced and analysed and how this can enable better decision-making.
- Uses statistical, practical and ethical methods to design and enhance algorithms and has knowledge of how algorithms can be made scalable across various data sets.
- Is able to recognise the types of data needed to generate insights and support decision-making, and decides on the best principles to design/follow when transforming and analysing large and varied data sets.
- Actively uses a range of different visualisation and sense-making techniques to present trends and inform decision making.

Expert



- Champions the impact good quality data has on analytics and intelligence and helps process owners and modellers understand the standards for data within their part of the organisation.
- Oversees the design of algorithms, evaluating and championing ethics and advising on how they can be resiliently scaled across large data sets.
- Uses domain knowledge and industry experience to inform and influence the types of data and analysis methods that should be used to address business and industry needs.
- Is able to advise on best practice visualisation methods to present new evidence as well as being able to evaluate the quality and value of that evidence.

Digital Skill Areas

Definition and competency indicators

Data Fundamentals

Definition

Demonstrates the ability to create, use and communicate data in context. Articulates an understanding of data definitions and methods (data literacy). Knows what good quality data looks like and can articulate the purpose and value of using it, whilst recognising how to generate value and make decisions with it.

Some organisations are developing organisation-wide data literacy programmes but in most organisations leadership commitment is a key blocker for enabling this to happen.

Feedback from gap analysis

Awareness



- Shows an understanding of different data terms, types and sources.
- Uses established methods to collect, store and share data e.g. having a single source of truth for a digital file.
- Shows awareness of what good quality data looks like and how it informs decision-making.
- Demonstrates a strong understanding of the value of data.

Working



- Demonstrates the ability to manage different types of data according to its qualities.
- Uses knowledge of data to help others in the team to collect and store it efficiently.
- Able to generate good quality data to support their decision making.
- Able to articulate the value of data to others in a way that is easy to comprehend e.g. not using technical jargon.

Practitioner



- Guides others in their understanding of data terms, types and sources.
- Able to recognise the benefits of data to inform how to collect and manage it using both established and novel methods.
- Oversees the use of good quality data to support their own and other's decisions, including the types and quality of data needed and questions being addressed.
- Encourages others to see the value in data by promoting data sharing and an open data culture.

Expert



- Able to challenge existing definitions of data terms, types and sources and write new definitions where applicable.
- Demonstrates knowledge of methods and tools with the ability to present new data collection and storage methods coherently.
- Makes critical decisions by understanding and synthesising high volume, high velocity or complex heterogenous data and is able to spot quality issues and recommend improvements. Enables and coaches others to make data-driven decisions.
- Consistently defines new uses and value from data and is able to articulate the steps others need to take to generate increased value from data.

Digital Skill Areas

Definition and competency indicators

Data Modelling

Definition

Takes a systems-thinking and logical approach to plan, design, manage and optimise the flow of data, demonstrating clear understanding of engineering semantics such as ontologies, associated taxonomies and reference data. Recognises these concepts in relation to their broader impact on data sharing, interoperability and connected digital twins.

Organisations have a tendency to be technology-led rather than data-led. Where architecture has evolved over time, data tends to be held in silos which restricts ability to model data at an enterprise level.

Feedback from gap analysis

Awareness



- Can define the purpose of ontologies at a high level in relation to their organisation and industry.
- Recognises the semantics and related taxonomies of the industry and can classify data.
- Shows awareness of different reference data models that exist within the organisation and how they relate to business processes.
- Shows insight into the flow of data, including how data travels between systems and how systems are able to share data with one another.

Working



- Uses knowledge of standard ontologies in relation to their organisation and industry to influence how they distinguish data concepts and their relationships.
- Uses knowledge of taxonomies to create data models that classify and organise data into hierarchical meaning.
- Uses knowledge of reference data models to make organisable data models relevant to real world application.
- Able to build data products that can be exposed and integrated with other external systems, such as through Application Programmable Interfaces (APIs).

Practitioner



- Demonstrates the ability to write and maintain ontologies using logic and can represent how data concepts relate to each other.
- Demonstrates the ability to relate ontologies to complex taxonomies in order to classify and organise vast amounts of data.
- Demonstrates the ability to relate external reference data models to internal data models so that data can be categorised and shared across an organisation and externally with a shared understanding.
- Advises on design and data modelling to facilitate better data sharing and interoperability between systems.

Expert



- Able to advise on industry wide ontological development using logic, philosophy, collaboration and industry knowledge.
- Able to advise on the principles of logic and philosophy that apply to taxonomies and uses automation to classify and organise data at scale.
- Able to advise on industry wide reference data models based on industry knowledge of semantics to make data interoperability automated and coherent.
- Challenges behaviours that go against data sharing and interoperability and advocates for an open data approach through architecture model design.

Digital Skill Areas

Definition and competency indicators

Experience & Application

Definition

Crafts intuitive and engaging user experiences through user research and testing. Demonstrates an understanding of user interface design, facilitation and people to bridge the gap between data, technology and users - making technology more applicable and accessible.

“User experience is vital to the democratisation of digital twins and is an important skill for the successful development and adoption of the NDT.”

Feedback from gap analysis

Awareness



- Understands the basic principles of user research and experience in relation to the psychological interaction between humans and information and technology.
- Shows an awareness of how testing and reporting on user experience can add value.
- Understands the importance of user-led design to support technology adoption.

Working



- Able to use different user research techniques to elicit needs and build requirements.
- Undertakes testing and acquires user feedback to report on current experiences with design, technology and information.
- Able to create functional design and structure elements to make interfaces intuitive and engaging.

Practitioner



- Able to use different user research techniques to elicit needs and build requirements through user flows and wireframes.
- Performs Alpha/Beta testing and analyses user testing results.
- Reports on user experience in relation to technology adoption and is able to see trends and pinpoint why some choices are better/worse than others.
- Takes a leading role as a designer, overseeing the usability and functionality of technology interfaces, focusing on structure, contrast and accessibility.

Expert



- A leading authority on user research and design thinking with the ability to deep dive into user challenges and constraints when adopting technology.
- Able to perform user testing and analysis at scale and can articulate recommendations to improve and support technology development and adoption across different organisations.
- Fully understands the benefits of good user interface design and develops new and innovative techniques to improve the functionality and increase intuitive and engaging interaction with users.

Digital Skill Areas

Definition and competency indicators

Lifecycle Assurance & Quality Management

Definition

Understands how the relationship between lifecycle management, process modelling and data quality informs information requirements and data quality improvements. Embodies a quality improvement culture with targets to build trust and transparency of the processes and outcomes associated with data including its value and purposeful fit for informed decision-making.

Significant improvements are needed in this area. Shifting mindsets and behaviours is the key to solving this so individuals understand the holistic value of lifecycle management and the associated responsibilities across this.

Feedback from gap analysis

Awareness



- Can define the purpose of lifecycle management and explain how it may positively impact the quality of data.
- Can define the principles of process modelling including the 'as-is' and 'to-be' states and how this is presented using workflow design.
- Knows what good data looks like from understanding data quality dimensions (completeness, uniqueness, consistency, accuracy, timely, validity).
- Can define what questions need to be asked to understand information requirements.

Working



- Uses knowledge of lifecycle management to view processes in a holistic way, seeing the correlation between data inputs and outputs that occur as a result.
- Applies the principles of process modelling and workflow design to create business process artefacts that show events, action and connection points of a process.
- Uses knowledge of the data quality dimensions in their everyday practice to validate data.
- Researches what information is needed to enable certain decisions to be made and can map these requirements to processes.

Practitioner



- Demonstrates the ability to analyse the detail of lifecycle inputs and outputs and can pinpoint process and data quality issues that affect outputs and suggest improvements.
- Demonstrates the ability to model descriptive and perspective cross-functional processes, emphasising quality control for data inputs and outputs and the rationale for process design.
- Evaluates the quality of data in relation to fit for purpose (business need). Suggests improvements to governance and process to improve quality.
- Demonstrates the ability to influence process modelling based on information requirements, governance and compliance procedures that must be in place.

Expert



- Able to advise on best practices for lifecycle management to improve process and the quality of data outputs. Can predict potential data quality risks and issues with lifecycles and suggest mitigation.
- Models lifecycle processes that consider internal and external events, actions and connection points. Makes critical decisions on process improvements to reduce waste and improve data quality and integration.
- Able to demonstrate the impact fit for purpose data has on decision making and value. Works with others to set standards, governance and targets for data quality in relation to the purpose it serves.
- Inspires teams to develop process and information requirements with the end in mind, focusing on what decisions need answering and working backwards to map data flows.

Digital Skill Areas

Definition and competency indicators

Security & Ethics

Definition

Acts as a governing and compliance authority to inform how data is used. Embodies a secure by design approach to cyber security, promoting security mindedness and business continuity. Considers data decisions in context of business integrity and ethics whilst ensuring data privacy and legal obligations are adhered to.

"We need more than the data teams, we need specialist security type roles. It is important we share models, policies and standards as well as data for realisation of the National Digital Twin."

Feedback from gap analysis

Awareness



- Adheres to ethical and legal standards and protocols when using data.
- Demonstrates an awareness of security, threats, vulnerabilities and risks that could occur across the organisation within their projects, assets and services they deliver - paying particular attention to systems and legacy management.
- Understands the purpose of business impact analysis, crisis management, continuity and recovery plans in relation to IT policy and regulatory requirements.
- Understands the regulatory and ethical importance of data privacy.

Working



- Understands the reasoning behind different ethical and legal standards and protocols that surround data, including its quality and use (including sharing).
- Practices secure methods when collecting and analysing data whilst showing working knowledge of how to respond to threats, vulnerabilities and risks in a way that is appropriate and proportionate - paying particular attention to surrounding organisational landscape, systems and legacy management.
- Performs business impact analysis and technology risk assessments in relation to IT policy and regulatory requirements.
- Practices good understanding of data privacy by gaining consent to use personal data and/or anonymising data when individuals could be identified.

Practitioner



- Able to author internal organisational ethical and governance standards and protocols. Acts as the first point of escalation for non-compliance.
- Able to articulate security and ethical design requirements and recommend measures to ensure systems stay secure and prevent threats, vulnerabilities and risks and protect against the loss of valuable commercial information, personal data and intellectual property.
- Able to analyse risk and perform steps to manage crisis issues and develop and implement continuity and recovery plans.
- Can justify the use of personal or sensitive data when challenges on business, ethical and legal grounds.

Expert



- Defines best practice for standards and protocols and sets tasks and targets in relation to legal compliance, governance procedures and business integrity. Acts as the final point of escalation for non-compliance.
- Actively drives a secure by design approach to choosing, using and designing technology. Raises awareness of security mindedness to encourage leaders, managers and individuals to play their part in recognising threats, minimising risks, complying with policies and processes, and responding to incidents or breaches.
- Promotes continuous assessment of cyber security risk and resilience by ensuring penetration testing is performed to ensure business continuity and legal obligations are met. Stays up to date with hacking methods to recommend technology and processes to prevent attacks.
- Advocates for individual awareness of data privacy measures and promotes ethical considerations that puts control back in the hand of the individual for the public good.

Understanding role profiles

Summary

Role Profiles are a valuable tool for identifying roles across an organisation or industry that may need to change or be introduced to enable technology advancement. Roles are a specific grouping of tasks and do not always map one-to-one with an individual. Individuals performing a role may take on other roles within their organisation, or parts of the role may be performed by multiple people.

They can be used to build skill and competency requirements into job descriptions to support recruitment and training activities.

In this Framework, the role profiles outlined are of relevance to the successful development and adoption of the IMF to support the National Digital Twin. The roles shown have been prioritised in relation to their criticality in the adoption of the programmes at both an organisational and national level.

This is not to say that other roles are not needed. Improving the digital literacy of everyone who works in the built environment is a key enabler of the National Digital Twin and should be pursued in parallel to upskilling the high priority roles set out in this Framework.

Definitions

National Role

The specific name given to a grouping of tasks and responsibilities performed at the national level. They are typically responsible for influencing and advising the industry.

Example: Individuals that sit within these bodies: CDBB, BEIS (Department for Business, Energy and Industrial Strategy) and ODI (Open Data Institute) etc.

Organisational Role

The specific name given to a grouping of tasks and responsibilities performed at the organisational level. They are typically responsible for influencing and advising their own organisation and adopting national guidelines.

Example: Individuals that sit within these type of organisations: asset owners and operators such as water and energy companies and transport operators.

New Role

The specific name given to a new grouping of tasks and responsibilities performed at either the national or organisational level. They represent where there is currently a gap in the industry that needs to be filled.

Example: National Ontologist

Priority Role

The specific name given to a critical grouping of tasks and responsibilities performed at either the national or organisational level. They represent the key roles that are fundamental to the adoption of the IMF and NDT.

Example: Data Custodian

Need More

An identifier to represent where the industry needs to make this role more commonplace and raise quality standards.

List of roles

IMF and NDT early adoption priority roles

Organisational

- Cyber Security Specialist
- Data Architect
- Data Consumer
- Data Custodian
- Data Producer
- Data Steward
- Data Leader
- Process Modeller

National

- Benefits Manager
- Cyber Security Specialist
- Data Regulator
- Industry Leader
- NDT Architect
- Ontologist
- Policy Maker
- Sector Regulator

Additional roles needed

- Business Analyst
- Benefits Manager (org)
- Change Manager
- Data Governance Specialist
- Data Quality Analyst
- Enterprise Architect
- Product Manager
- Process Owner
- User Researcher

! Please note: Roles do not always map one-to-one with an individual. Individuals performing a role may take on other roles within their organisation, or parts of the role may be performed by multiple people.

Methodology

To understand the roles needed to develop and adopt the IMF and support the NDT we conducted a series of workshops with stakeholders across industry, government and academia.

From these focus groups, we performed a thematic analysis on the qualitative data received and divided these into the most prevalent national and organisational roles. We have tried to ensure these are easy to understand for a wide variety

of audiences and relatable to the skills and competencies identified.

Whilst not every organisation will have these as named roles, through developing Role Profiles we have sought to unpack the tasks and responsibilities of the role so that someone reviewing the Framework can recognise an individual or a number of individuals may be performing the role even if their job title is different.



Cyber Security Specialist

Organisational

Overview

Cyber Security Specialists use technologies, processes and controls to protect internet-connected systems such as hardware, software and data from cyber attacks. They also protect against the unauthorised exploitation of systems, networks and technologies. They are able to promote business continuity and trust in an organisations ability to prevent themselves from cyber attacks and malicious intervention that could harm other organisations, individuals or the country. They collaborate with other security roles to ensure a holistic approach is taking to security, taking into consideration personnel, physical, cyber and cross-cutting security, overseen by good governance with clear lines of responsibility and accountability.

Responsibilities

- Performs regular audits to ensure security practices are compliant.
- Constantly monitors for attacks and intrusions whilst looking for vulnerabilities and risks in hardware and software, closing off security vulnerabilities when there is a potential threat or attempted breach.
- Implements comprehensive vulnerability management systems across all assets on-premises and in the cloud.
- Collaborates with IT operations to set up a shared disaster recovery/ business continuity plans.
- Works with internal communications and line management to educate employees on security mindedness - promoting an understanding of and empowering all individuals to routinely apply appropriate and proportional security measures in any business situation to deter and/or disrupt hostile, malicious, fraudulent and criminal behaviours or activities.

Collaborates with

- Data Custodian
- Data Architect
- Data Governance Specialists

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

ADAPTABILITY



- Creates opportunities and forums for people to share knowledge and ideas across the organisation.
- Anticipates organisational challenges and plans ahead to navigate them.
- Builds motivation for improvement across the organisation.
- Facilitates and promotes innovative ideas across the organisation.

BUSINESS ANALYSIS



- Demonstrates competence in the use of analytical tools and technology to analyse data.
- Demonstrates an understanding of how one issue may be part of a much larger system.
- Produces workable solutions to more complex team problems.
- Helps to educate others on the importance of data ethics in relation to data manipulation.

COMMUNICATION



- Listens and shows understanding of specific data challenges within their department or function.
- Communicates courageously upwards on the limitations of current data management and shares best practice.
- Opens a dialogue with others in the business to understand what information they need to do their jobs.
- Articulates the strategy using a compelling story to influence others on the needs of their department or function.

! Please note this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.

Digital Skill Areas

DATA FUNDAMENTALS



- Guides others in their understanding of data terms, types and sources.
- Able to recognise the benefits of data to inform how to collect and manage it using both established and novel methods.
- Oversees the use of good quality data to support their own and other's decisions, including the types and quality of data needed and questions being addressed.
- Encourages others to see the value in data by promoting data sharing and an open data culture.

DATA MODELLING

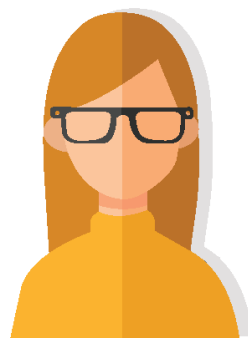


- Uses knowledge of standard ontologies in relation to their organisation and industry to influence how they distinguish data concepts and their relationships.
- Uses knowledge of taxonomies to create data models that classify and organise data into hierarchical meaning.
- Uses knowledge of reference data models to make organisable data models relevant to real world application.
- Able to build data products that can be exposed and integrated with other external systems, such as through Application Programmable Interfaces (APIs).

SECURITY & ETHICS



- Defines best practice for standards and protocols and sets tasks and targets in relation to legal compliance, governance procedures and business integrity. Acts as the final point of escalation for non-compliance.
- Actively drives a secure by design approach to choosing, using and designing technology. Raises awareness of security mindedness to encourage leaders, managers and individuals to play their part in recognising threats, minimising risks, complying with policies and processes, and responding to incidents or breaches.
- Promotes continuous assessment of cyber security risk and resilience by ensuring penetration testing is performed to ensure business continuity and legal obligations are met. Stays up to date with hacking methods to recommend technology and processes to prevent attacks.
- Advocates for individual awareness of data privacy measures and promotes ethical considerations that puts control back in the hand of the individual for the public good.



Data Architect

Organisational

Overview

Data Architects are directed by the business to set the vision for the organisations use of data. They plan and design how data in systems relate to each other in a way that aims to integrate, centralise, protect and maintain the data that resides in systems. They collaborate with process modellers and owners to ensure individuals have the right access to information, in the right place, at the right time.

Responsibilities

- Acts as the main point of contact for designing how an organisation uses data and the information flows and systems needed to deliver the business strategy.
- Promotes data sharing and value through the development of system interoperability.
- Promotes a data sharing and security mindedness culture that is secure by design and compliant with data governance rules and regulations.
- Defines the process needed to move towards cloud based systems and architecture, transforming on-premises systems onto more accessible online platforms.

Collaborates with

- Data Leader
- Data Steward
- Data Custodian
- Data Producers
- Data Consumer
- Security Specialists

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

ADAPTABILITY



- Creates opportunities and forums for people to share knowledge and ideas across the organisation.
- Anticipates organisational challenges and plans ahead to navigate them.
- Builds motivation for improvement across the organisation.
- Facilitates and promotes innovative ideas across the organisation.

BUSINESS ANALYSIS



- Applies specialist and detailed technical expertise to analyse organisational data.
- Shows ability to identify common themes and core issues across the organisation.
- Produces workable solutions to complex organisational problems.
- Calculates and advises on risk/reward ratio of investment in data analysis and sharing.

COLLABORATION



- Invests time to understand cross functional objectives, KPIs and how they interrelate.
- Collaborates cross functionally with the big picture in mind to enhance strategic decision making.
- Encourages and facilitates the sharing of data cross functionally to optimise decision making.
- Builds trusting relationships across the entire organisation.

Digital Skill Areas

DATA FUNDAMENTALS



- Guides others in understanding of data terms, types and sources.
- Able to recognise the benefits of data to inform how to collect and manage it using both established and novel methods.
- Oversees the use of good quality data to support their own and other's decisions, including the types and quality of data needed and questions being addressed.
- Encourages others to see the value in data by promoting data sharing and an open data culture.

DATA MODELLING



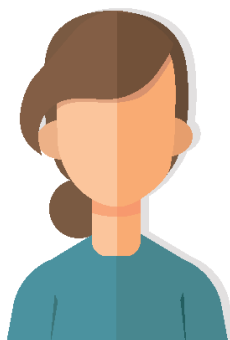
- Demonstrates the ability to write and maintain ontologies using logic and can represent how data concepts relate to each other.
- Demonstrates the ability to relate ontologies to complex taxonomies in order to classify and organise vast amounts of data.
- Demonstrates the ability to relate external reference data models to internal data models so that data can be categorised and shared across an organisation and externally with a shared understanding.
- Advises on design and data modelling to facilitate better data sharing and interoperability between systems.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



- Uses knowledge of lifecycle management to view processes in a holistic way, seeing the correlation between data inputs and outputs that occur as a result.
- Applies the principles of process modelling and workflow design to create business process artefacts that show events, action and connection points of a process.
- Uses knowledge of the data quality dimensions in their everyday practice to validate data.
- Researches what information is needed to enable certain decisions to be made and can map these requirements to processes.

! Please note this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.



Data Consumer

Organisational

Overview

Everyone in an organisation can be considered a Data Consumer because they use data in their work to get their job done. For example information that is read over email and presented in reports and systems.

All data consumers should be able to know what good quality data looks like, so that they can define requirements and assess that they can trust the data they are working with to inform the decisions they make with it. All data consumers should be security-minded when working with data.

Responsibilities

- Receives data to perform queries, analysis, and reporting for decision making, usually in the form of information.
- As the end user of the data, they need to participate in defining business terms and processes to get the right data that is fit for purpose (a key part of data quality standards).
- Ensures that their consumption and usage of data complies with data governance and ethics policies as well as data sharing agreements.
- As a consumer, they also have stewardship responsibilities for identifying errors and issues in data and working with appropriate teams to rectify any quality issues.
- All data consumers have a part to play in understanding and routinely applying appropriate and proportional security measures in any business situation to deter and/or disrupt hostile, malicious, fraudulent and criminal behaviours or activities.

Collaborates with

- Everyone

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

BUSINESS ANALYSIS



- Applies specialist and detailed technical expertise to analyse organisational data.
- Shows ability to identify common themes and core issues across the organisation.
- Produces workable solutions to complex organisational problems.
- Calculates and advises on risk/reward ratio of investment in data analysis and sharing.

COLLABORATION



- Invests time to understand the needs and objectives of other teams in the organisation.
- Collaborates across teams, sharing data in order to enhance team decision making.
- Shares and cascades relevant information across departments.
- Builds trusting relationships across other teams.

COMMUNICATION



- Listens to understand the specific data challenges within their team.
- Shares best practice with other business units and across industry.
- Communicates a compelling story to their team as to the need for better quality data management.
- Articulates key data management challenges to department head/function.

Digital Skill Areas

DATA FUNDAMENTALS



- Demonstrates the ability to manage different types of data according to its qualities.
- Uses knowledge of data to help others in the team to collect and store it efficiently.
- Able to generate good quality data to support their decision making.
- Able to articulate the value of data to others in a way that is easy to comprehend e.g. not using technical jargon.

EXPERIENCE & APPLICATION



- Understands the basic principles of user research and experience in relation to the psychological interaction between humans and information and technology.
- Shows an awareness of how testing and reporting on user experience can add value.
- Understands the importance of user-led design to support technology adoption.

SECURITY & ETHICS



- Adheres to ethical and legal standards and protocols when using data.
- Demonstrates an awareness of security, threats, vulnerabilities and risks that could occur across the organisation within their projects, assets and services they deliver - paying particular attention to systems and legacy management.
- Understands the purpose of business impact analysis, crisis management, continuity and recovery plans in relation to IT policy and regulatory requirements.
- Understands the regulatory and ethical importance of data privacy.

! Please note this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.



Data Custodian

Organisational

Overview

Data Custodians are responsible for the aggregation, storage and use of data sets. They often sit within the IT function and deal with the actual nuts and bolts of transporting and storing data, rather than issues around what data is. Examples of this role include data engineers and database administrators.

Responsibilities

- Acts as the main point of contact for aggregating, storing and enabling the use of data (including data sharing) for the semantic web using programming languages.
- Collaborates with enterprise, system architects and cyber security specialists to develop the right safeguards and security measures to deter and/or disrupt hostile, malicious, fraudulent and criminal behaviours or activities. Protecting the confidentiality, integrity and availability of data.
- Promotes integration by aggregating data and making sharing data possible by moving towards automation to create efficiencies.

Collaborates with

- Data Consumer
- Data Steward
- Data Owner
- Data Lead
- Cyber Security Specialist
- Architects
- Process Owner

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

BUSINESS ANALYSIS



- Separates information into component parts, patterns and relationships.
- Probes for further information or greater understanding of a problem.
- Produces workable solutions to a range of basic problems.
- Represents data in a truthful way, without misleading others.

COMMERCIAL MINDSET



- Understands commercial KPIs for own role and team.
- Identifies opportunities and sources the right quality data to drive commercial decisions in own role.
- Shows ability to create a simple business case for where better quality data is needed in own role.

COMMUNICATION



- Listens to understand the specific data challenges within their team.
- Shares best practice with other business units and across industry.
- Communicates a compelling story to their team as to the need for better quality data management.
- Articulates key data management challenges to department head/function.

Digital Skill Areas

ANALYTICS & INTELLIGENCE



- Actively engages others to build an understanding on the quality requirements of data being produced and analysed and how this can enable better decision-making.
- Uses statistical, practical and ethical methods to design and enhance algorithms and has knowledge of how algorithms can be made scalable across various data sets.
- Able to recognise the types of data needed to generate insights and support decision-making, and decides on the best principles to design/follow when transforming and analysing large and varied data sets.
- Actively uses a range of different visualisation and sense-making techniques to present trends and inform decision making.

DATA MODELLING



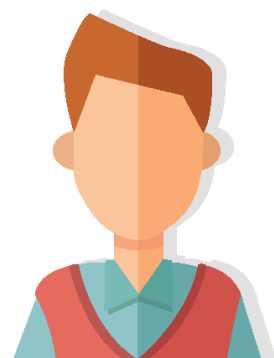
- Demonstrates the ability to write and maintain ontologies using logic and can represent how data concepts relate to each other.
- Demonstrates the ability to relate ontologies to complex taxonomies in order to classify and organise vast amounts of data.
- Demonstrates the ability to relate external reference data models to internal data models so that data can be categorised and shared across an organisation and externally with a shared understanding.
- Advises on design and data modelling to facilitate better data sharing and interoperability between systems.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



- Demonstrates the ability to analyse the detail of lifecycle inputs and outputs and can pinpoint process and data quality issues that affect outputs and suggest improvements.
- Demonstrates the ability to model descriptive and perspective cross-functional processes, emphasising quality control for data inputs and outputs and the rationale for process design.
- Evaluates the quality of data in relation to fit for purpose (business need). Suggests improvements to governance and process to improve quality.
- Demonstrates the ability to influence process modelling based on information requirements, governance and compliance procedures that must be in place.

! Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.



Data Producer

Organisational

Overview

Everyone in an organisation can be considered a Data Producer because they represent anyone who can create, update and delete data. For example those who enter data into a system or application, or write a report. They are aware of the quality requirements for data they create and are usually accountable for the accuracy of the data they produce and the security measures that sit around this.

Responsibilities

- Understands how the data they produce will be used and play a critical role in maintaining and improving the quality of an organisation's data.
- Accountable for the quality of data they produce and following compliance procedures such as data privacy regulations.
- All data consumers have a part to play in understanding and routinely applying appropriate and proportional security measures in any business situation to deter and/or disrupt hostile, malicious, fraudulent and criminal behaviours or activities.

Collaborates with

- Everyone

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

ADAPTABILITY



- Creates opportunities and forums for people to share knowledge and ideas across the organisation.
- Anticipates organisational challenges and plans ahead to navigate them.
- Builds motivation for improvement across the organisation.
- Facilitates and promotes innovative ideas across the organisation.

BUSINESS ANALYSIS



- Demonstrates competence in the use of analytical tools and technology to analyse data.
- Demonstrates an understanding of how one issue may be part of a much larger system.
- Produces workable solutions to more complex team problems.
- Helps to educate others on the importance of data ethics in relation to data manipulation.

COMMUNICATION



- Listens and shows understanding of specific data challenges within their department or function.
- Communicates courageously upwards on the limitations of current data management and shares best practice.
- Opens a dialogue with others in the business to understand what information they need to do their jobs.
- Articulates the strategy using a compelling story to influence others on the needs of their department or function.

Digital Skill Areas



DATA FUNDAMENTALS



- Demonstrates the ability to manage different types of data according to its qualities.
- Uses knowledge of data to help others in the team to collect and store it efficiently.
- Able to generate good quality data to support their decision making.
- Able to articulate the value of data to others in a way that is easy to comprehend e.g. not using technical jargon.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



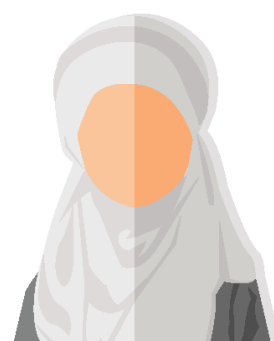
- Can define the purpose of lifecycle management and explain how it may positively impact the quality of data.
- Can define the principles of process modelling including the 'as-is' and 'to-be' states and how this is presented using workflow design.
- Knows what good data looks like from understanding data quality dimensions (completeness, uniqueness, consistency, accuracy, timely, validity).
- Can define what questions need to be asked to understand information requirements.

SECURITY & ETHICS



- Adheres to ethical and legal standards and protocols when using data.
- Demonstrates an awareness of security, threats, vulnerabilities and risks that could occur across the organisation within their projects, assets and services they deliver - paying particular attention to systems and legacy management.
- Understands the purpose of business impact analysis, crisis management, continuity and recovery plans in relation to IT policy and regulatory requirements.
- Understands the regulatory and ethical importance of data privacy.

! Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.



Data Steward

Organisational

NEED
MORE

Overview

Data Stewards are primary advocates for data quality and usually operate within the data/information management and governance disciplines. They are sometimes called Data Owners and help to define data procedures, standards and guidelines and engage others in the quality management process.

This role can exist at the discipline, function, business process, system or project level and can work successfully if empowered to work across departments and domains to promote good quality data leading to better integration and value.

Responsibilities

- Maintains and oversees the quality of data by sharing knowledge and guiding others on best practice to promote a quality improvement culture.
- Expert in understanding what 'good quality' means for data and will monitor and advise on the topic using reports and dashboards.
- Understands how good quality data impacts value and shares this knowledge with others to encourage best practice.
- Acts as a point of contact for data quality related issues, often mediating conversations between business and IT.

Collaborates with

- Everyone

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

COLLABORATION



- Invests time to understand objectives of external stakeholders and identifies common needs and challenges.
- Collaborates with other organisations/national institutions, sharing data to derive greater value and make strategic decisions, having the national interest in mind.
- Role models a culture of openness and sharing within the organisation.
- Builds trusting relationships both organisationally and nationally.

COMMUNICATION



- Listens and shows understanding of specific data challenges within their department or function.
- Communicates courageously upwards on the limitations of current data management and shares best practice.
- Opens a dialogue with others in the business to understand what information they need to do their jobs.
- Articulates the strategy using a compelling story to influence others on the needs of their department or function.

TRANSFORMATIONAL LEADERSHIP



- Translates the national/organisational vision across the business/national institution, gaining buy-in.
- Empowers others to hold their teams to account on the guidelines and protocols that govern the management of data.
- Identifies strengths and skill gaps within the organisation/national institution related to digital evolution and change.
- Facilitates the development of identified skill gaps e.g. through sourcing appropriate scalable programmes or resources.

! Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.

Digital Skill Areas

DATA FUNDAMENTALS



- Guides others in their understanding of data terms, types and sources.
- Able to recognise the benefits of data to inform how to collect and manage it using both established and novel methods.
- Oversees the use of good quality data to support their own and other's decisions, including the types and quality of data needed and questions being addressed.
- Encourages others to see the value in data by promoting data sharing and an open data culture.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT

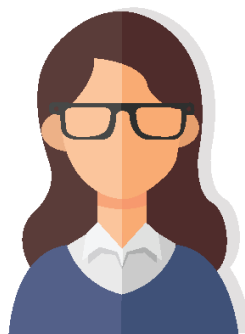


- Demonstrates the ability to analyse the detail of lifecycle inputs and outputs and can pinpoint process and data quality issues that affect outputs and suggest improvements.
- Demonstrates the ability to model descriptive and perspective cross-functional processes, emphasising quality control for data inputs and outputs and the rationale for process design.
- Evaluates the quality of data in relation to fit for purpose (business need). Suggests improvements to governance and process to improve quality.
- Demonstrates the ability to influence process modelling based on information requirements, governance and compliance procedures that must be in place.

SECURITY & ETHICS



- Understands the reasoning behind different ethical and legal standards and protocols that surround data, including its quality and use (including sharing).
- Practices secure methods when collecting and analysing data whilst showing working knowledge of how to respond to threats, vulnerabilities and risks in a way that is appropriate and proportionate - paying particular attention to surrounding organisational landscape, systems and legacy management.
- Performs business impact analysis and technology risk assessments in relation to IT policy and regulatory requirements.
- Practices good understanding of data privacy by gaining consent to use personal data and/or anonymising data when individuals could be identified.



Data Leader

Organisational

NEED
MORE

Overview

Data Leaders inspire a shared vision on the benefits of data, seeing it as a defining asset and key business responsibility needed to meet strategic objectives and promote social outcomes. They believe better data is critical to improving the quality of decision making and hence improving business performance.

They understand that data needs to be made available to those who need it to support their processes, while protecting it from illicit or immoral use.

They motivate groups of people and are forward thinking in their approach. They champion the value of digital assets and data quality in a collaborative way and are usually someone in a position of authority.

Responsibilities

- Sets the vision on how the organisation can get value out of data.
- Develops Policy, Strategy and Plans to improve maturity in how data is managed.
- Builds relationships and information exchanges with external stakeholders such as customers, contributors and industry bodies
- Moves the organisation away from a data protective culture towards sharing data to drive organisation benefits and public good.
- Builds and empowers a culture that sees data as an asset and makes everyone see they have a role in improving data quality and ensuring that data is securely managed, used and shared.

Collaborates with

- Industry bodies and policy makers
- Shareholders
- Customers
- Employees
- Funding Bodies

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

COLLABORATION



- Invests time to understand objectives of external stakeholders and identifies common needs and challenges.
- Collaborates with other organisations/national institutions, sharing data to derive greater value and make strategic decisions, having the national interest in mind.
- Role models a culture of openness and sharing within the organisation.
- Builds trusting relationships both organisationally and nationally.

COMMUNICATION



- Listens deeply to understand specific business and technical challenges within and across organisations.
- Influences key stakeholders at c-suite and national level by promoting understanding on how quality data leads better and more informed decision-making.
- Translates the technical concepts of the IMF into practical, accessible language with minimal use of technical jargon.
- Tells a powerful story of the “Why” for digital transformation with passion and authenticity, using a variety of styles to maximise impact on the audience.

TRANSFORMATIONAL LEADERSHIP



- Creates a vision grounded in real world purpose at national/organisational level with clear goals which support everyone to understand and achieve the wider strategy of a digital twin and NDT.
- Champions the guidelines and protocols that govern the management of data and empowers everyone to take responsibility for these.
- Analyses current and future trends to proactively identify future talent needs for the business/national institution and puts in place plans to build capabilities required.



Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.

Digital Skill Areas

DATA FUNDAMENTALS



- Able to challenge existing definitions of data terms, types and sources and write new definitions where applicable.
- Demonstrates knowledge of methods and tools with the ability to present new data collection and storage methods coherently.
- Makes critical decisions by understanding and synthesising high volume, high velocity or complex heterogeneous data and is able to spot quality issues and recommend improvements. Enables and coaches others to make data-driven decisions.
- Consistently defines new uses and value from data and is able to articulate the steps others need to take to generate increased value from data.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



- Uses knowledge of lifecycle management to view processes in a holistic way, seeing the correlation between data inputs and outputs that occur as a result.
- Applies the principles of process modelling and workflow design to create business process artefacts that show events, action and connection points of a process.
- Uses knowledge of the data quality dimensions in their everyday practice to validate data.
- Researches what information is needed to enable certain decisions to be made and can map these requirements to processes.

SECURITY & ETHICS



- Able to author internal organisational ethical and governance standards and protocols. Acts as the first point of escalation for non-compliance.
- Able to articulate security and ethical design requirements and recommend measures to ensure systems stay secure and prevent threats, vulnerabilities and risks and protect against the loss of valuable commercial information, personal data and intellectual property.
- Able to analyse risk and perform steps to manage crisis issues and develop and implement continuity and recovery plans.
- Can justify the use of personal or sensitive data when challenges on business, ethical and legal grounds.



Process Modeller

Organisational

Overview

Process Modellers are responsible for creating, sustaining and improving processes within an organisation.

They aim to create efficiencies, drive process quality enhancements, improve communication and promote correct adherence to the process.

They are a subject matter expert on the process and understand the stakeholders and tools involved to make the process successful and secure.

Responsibilities

- Develops processes by collaborating with stakeholders involved including the process owner.
- Clearly communicates process change to all who are affected, including dependencies and downstream effects.
- Ensures all processes information (including information on recent changes) are accessible and available to all when needed.
- Reviews current process in line with strategic goals, aiming to use technology to deliver efficiencies.
- Works with data stewards and data leaders to understand where process improvements may increase the quality and use of data and transforms processes accordingly.

Collaborates with

- Process Owner
- Data Leader
- Data Steward
- Data Custodians
- Data Producer
- Data Consumer
- Systems Architect

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

COLLABORATION



- Invests time to understand cross functional objectives, KPIs and how they interrelate.
- Collaborates cross functionally with the big picture in mind to enhance strategic decision making.
- Encourages and facilitates the sharing of data cross functionally to optimise decision making.
- Builds trusting relationships across the entire organisation.

COMMUNICATION



- Listens and shows understanding of specific data challenges within their department or function.
- Communicates courageously upwards on the limitations of current data management and shares best practice.
- Opens a dialogue with others in the business to understand what information they need to do their jobs.
- Articulates the strategy using a compelling story to influence others on the needs of their department or function.

TRANSFORMATIONAL LEADERSHIP



- Translates the national/organisational vision for their team, gaining buy-in.
- Facilitates understanding and holds their team to account on the guidelines and protocols that govern the management of data.
- Works with other team members to help them understand strengths and development areas related to digital evolution and change.
- Coaches, mentors and develops the skills related to digital transformation in the team.



Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.

Digital Skill Areas

DATA FUNDAMENTALS



- Guides others in their understanding of data terms, types and sources.
- Able to recognise the benefits of data to inform how to collect and manage it using both established and novel methods.
- Oversees the use of good quality data to support their own and other's decisions, including the types and quality of data needed and questions being addressed.
- Encourages others to see the value in data by promoting data sharing and an open data culture.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



- Uses knowledge of lifecycle management to view processes in a holistic way, seeing the correlation between data inputs and outputs that occur as a result.
- Applies the principles of process modelling and workflow design to create business process artefacts that show events, action and connection points of a process.
- Uses knowledge of the data quality dimensions in their everyday practice to validate data.
- Researches what information is needed to enable certain decisions to be made and can map these requirements to processes.

SECURITY & ETHICS



- Understands the reasoning behind different ethical and legal standards and protocols that surround data, including its quality and use (including sharing).
- Practices secure methods when collecting and analysing data whilst showing working knowledge of how to respond to threats, vulnerabilities and risks in a way that is appropriate and proportionate - paying particular attention to surrounding organisational landscape, systems and legacy management.
- Performs business impact analysis and technology risk assessments in relation to IT policy and regulatory requirements.
- Practices good understanding of data privacy by gaining consent to use personal data and/or anonymising data when individuals could be identified.



Benefits Manager

National

NEW
ROLE

Overview

Benefits Managers seek to quantify, track and manage benefits and outcomes aligned to specific activities and outputs. Benefits could be anything from revenue generation, efficiency and the elimination of waste to the benefits of avoiding mistakes and reducing risks.

They promote and adopt an early benefits realisation culture and present tangible and quantitative benefits for sharing data for a number of different stakeholders.

Responsibilities

- Tracks and communicates the benefits and outcomes of different activities and outputs in relation to the IMF and NDT.
- Aligns to an iterative delivery model to promote early benefits realisation and ensures that outcomes are for the public good.
- Typically builds use cases around the value of activities in relation to their short-term, medium-term and long-term gains to help secure funding and encourage more organisations to adopt the IMF and support the NDT.
- Identifies waste as the cost of mistakes and disasters as a primary source of benefits that can be gained by decisions being informed by fit-for-purpose data.

Collaborates with

- Industry Leaders
- Business Analysts
- Programme Office
- Data Custodians

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

BUSINESS ANALYSIS



- Applies specialist and detailed technical expertise to analyse organisational data.
- Shows ability to identify common themes and core issues across the organisation.
- Produces workable solutions to complex organisational problems.
- Calculates and advises on risk/reward ratio of investment in data analysis and sharing.

COMMERCIAL MINDSET



- Contributes to setting commercial KPIs for the entire business.
- Identifies user opportunities and sources the right quality data to drive effective decisions across the organisation.
- Shows ability to create a complex business case for where better quality data is needed.
- Demonstrates and clearly articulates a strong understanding of commercial strategy and how it contributes to the NDT.

COMMUNICATION



- Listens and shows understanding of specific data challenges within their department or function.
- Communicates courageously upwards on the limitations of current data management and shares best practice.
- Opens a dialogue with others in the business to understand what information they need to do their jobs.
- Articulates the strategy using a compelling story to influence others on the needs of their department or function.

Digital Skill Areas

ANALYTICS & INTELLIGENCE



- Awareness of what good quality data looks like in relation to its ability to be analysed and inform decision-making.
- Knowledge of mathematical and statistical techniques for analysing data.
- Awareness of how to use scientific methods to manipulate data when running analyses, including extrapolation and regression.
- Has knowledge of different mediums used to convey information (e.g. reports, visualisations, dashboards).

DATA FUNDAMENTALS



- Demonstrates the ability to manage different types of data according to its qualities.
- Uses knowledge of data to help others in the team to collect and store it efficiently.
- Able to generate good quality data to support their decision making.
- Able to articulate the value of data to others in a way that is easy to comprehend e.g. not using technical jargon.

SECURITY & ETHICS



- Adheres to ethical and legal standards and protocols when using data.
- Demonstrates an awareness of security, threats, vulnerabilities and risks that could occur across the organisation within their projects, assets and services they deliver - paying particular attention to systems and legacy management.
- Understands the purpose of business impact analysis, crisis management, continuity and recovery plans in relation to IT policy and regulatory requirements.
- Understands the regulatory and ethical importance of data privacy.

! Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.



Cyber Security Specialist

National

Overview

Cyber Security Specialists use technologies, processes and controls to protect internet-connected systems such as hardware, software and data from cyber attacks. They also protect against the unauthorised exploitation of systems, networks and technologies. They are able to promote business continuity and trust in an organisations ability to prevent themselves from cyber attacks and malicious intervention that could harm other organisations, individuals or the country. They collaborate with other security roles to ensure a holistic approach is taking to security, taking into consideration personnel, physical, cyber and cross-cutting security, overseen by good governance with clear lines of responsibility and accountability.

Responsibilities

- Works with data regulators to develop best practice advice to support organisations in performing regular audits for compliant purposes.
- Monitors for attacks and intrusions on the NDT whilst looking for vulnerabilities and risks in hardware and software. Reports on these to the effected organisations so that they act to close off security vulnerabilities.
- Advises organisations involved in the NDT to implement comprehensive vulnerability management systems across all assets on-premises and in the cloud.
- Sets best practice guidance for organisations by promoting Security mindedness - an understanding of and empowering all individuals to routinely apply appropriate and proportional security measures in any business situation to deter and/or disrupt hostile, malicious, fraudulent and criminal behaviours or activities.

Collaborates with

- Data Custodian
- Data Architect
- Data Governance Specialists
- Data Regulators
- Sector Regulators

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

ADAPTABILITY



- Drives a continuous learning culture within the organisation or national institution.
- Creates resilient strategies and operations.
- Creates a safe environment where others can talk openly about personal strengths and development needs in order to improve.
- Champions innovation across the organisation and/or nationally.

BUSINESS ANALYSIS



- Applies specialist and detailed technical expertise to analyse organisational data.
- Shows ability to identify common themes and core issues across the organisation.
- Produces workable solutions to complex organisational problems.
- Calculates and advises on risk/reward ratio of investment in data analysis and sharing.

COMMUNICATION



- Listens deeply to understand specific business and technical challenges within and across organisations.
- Influences key stakeholders at c-suite and national level by promoting understanding on how quality data leads better and more informed decision-making.
- Translates the technical concepts of the IMF into practical, accessible language with minimal use of technical jargon.
- Tells a powerful story of the “Why” for digital transformation with passion and authenticity, using a variety of styles to maximise impact on the audience.

! Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.

Digital Skill Areas

DATA FUNDAMENTALS



- Able to challenge existing definitions of data terms, types and sources and write new definitions where applicable.
- Demonstrates knowledge of methods and tools with the ability to present new data collection and storage methods coherently.
- Makes critical decisions by understanding and synthesising high volume, high velocity or complex heterogenous data and is able to spot quality issues and recommend improvements. Enables and coaches others to make data-driven decisions.
- Consistently defines new uses and value from data and is able to articulate the steps others need to take to generate increased value from data.

DATA MODELLING



- Demonstrates the ability to write and maintain ontologies using logic and can represent how data concepts relate to each other.
- Demonstrates the ability to relate ontologies to complex taxonomies in order to classify and organise vast amounts of data.
- Demonstrates the ability to relate external reference data models to internal data models so that data can be categorised and shared across an organisation and externally with a shared understanding.
- Advises on design and data modelling to facilitate better data sharing and interoperability between systems.

SECURITY & ETHICS



- Defines best practice for standards and protocols and sets tasks and targets in relation to legal compliance, governance procedures and business integrity. Acts as the final point of escalation for non-compliance.
- Actively drives a secure by design approach to choosing, using and designing technology. Raises awareness for cyber security risks and the role and methods systems can play to prevent them being realised.
- Promotes continuous assessment of cyber security risk and resilience by ensuring penetration testing is performed to ensure business continuity and legal obligations are met. Stays up to date with hacking methods to recommend technology and processes to prevent attacks.
- Advocates for individual awareness of data privacy measures and promotes ethical considerations that puts control back in the hand of the individual for the public good.



Data Regulator

National

NEW
ROLE

Overview

The Data Regulator is an independent authority set up to uphold information rights for the public good.

They collaborate with regulated sectors, government bodies and other regulators to develop regulation that promotes openness, secure sharing and data privacy for individuals, organisations and the state - setting the framework for consistency.

They are focused on the legal, security and ethical use of data to drive national trust and transparency and ensure the nation benefits from availability, use and sharing of good quality data.

Responsibilities

- Investigates existing data processes, procedures and regulation within regulated industries and government bodies and collaborates with sector regulators to inform better practices that align to changes in technology, data and UK strategic aims such as the National Digital Twin.
- Informs sector regulators to specify data requirements and outlines challenges that the data regulator can support.
- Assesses quality, ethical and secure use of data of regulated industries and government departments to build an understanding of maturity levels, risk and inform best practice and regulation.

Collaborates with

- Policy Makers
- Industry Leaders
- Sector Regulators
- Security Regulators
- Legal Regulators

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

ADAPTABILITY



- Creates opportunities and forums for people to share knowledge and ideas across the organisation.
- Anticipates organisational challenges and plans ahead to navigate them.
- Builds motivation for improvement across the organisation.
- Facilitates and promotes innovative ideas across the organisation.

COLLABORATION



- Invests time to understand objectives of external stakeholders and identifies common needs and challenges.
- Collaborates with other organisations/national institutions, sharing data to derive greater value and make strategic decisions, having the national interest in mind.
- Role models a culture of openness and sharing within the organisation.
- Builds trusting relationships both organisationally and nationally.

COMMUNICATION



- Listens deeply to understand specific business and technical challenges within and across organisations.
- Influences key stakeholders at c-suite and national level by promoting understanding on how quality data leads better and more informed decision-making.
- Translates the technical concepts of the IMF into practical, accessible language with minimal use of technical jargon.
- Tells a powerful story of the “Why” for digital transformation with passion and authenticity, using a variety of styles to maximise impact on the audience.

! Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.

Digital Skill Areas

DATA FUNDAMENTALS



- Able to challenge existing definitions of data terms, types and sources and write new definitions where applicable.
- Demonstrates knowledge of methods and tools with the ability to present new data collection and storage methods coherently.
- Makes critical decisions by understanding and synthesising high volume, high velocity or complex heterogenous data and is able to spot quality issues and recommend improvements. Enables and coaches others to make data-driven decisions.
- Consistently defines new uses and value from data and is able to articulate the steps others need to take to generate increased value from data.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



- Able to advise on best practices for lifecycle management to improve process and the quality of data outputs. Can predict potential data quality risks and issues with lifecycles and suggest mitigation.
- Models lifecycle processes that consider internal and external events, actions and connection points. Makes critical decisions on process improvements to reduce waste and improve data quality and integration.
- Able to demonstrate the impact fit for purpose data has on decision making and value. Works with others to set standards, governance and targets for data quality in relation to the purpose it serves.
- Inspires teams to develop process and information requirements with the end in mind, focusing on what decisions need answering and working backwards to map data flows.

SECURITY & ETHICS



- Defines best practice for standards and protocols and sets tasks and targets in relation to legal compliance, governance procedures and business integrity. Acts as the final point of escalation for non-compliance.
- Actively drives a secure by design approach to choosing, using and designing technology. Raises awareness of security mindedness to encourage leaders, managers and individuals to play their part in recognising threats, minimising risks, complying with policies and processes, and responding to incidents or breaches.
- Promotes continuous assessment of cyber security risk and resilience by ensuring penetration testing is performed to ensure business continuity and legal obligations are met. Stays up to date with hacking methods to recommend technology and processes to prevent attacks.
- Advocates for individual awareness of data privacy measures and promotes ethical considerations that puts control back in the hand of the individual for the public good.



Industry Leader

National

NEED
MORE

Overview

A strategic leader who thinks long term on both an organisational and national level. This individual helps to create and effectively communicate the strategic vision of the IMF and NDT in a way that feels applicable to the majority and is easy to understand and cascade to others. This role takes the necessary opportunities for positive long-term change based on strategic priorities within the industry.

They motivate groups of people to achieve common industry wide goals and are forward thinking in their approach. They champion the value of digital assets and data quality in a collaborative way.

Responsibilities

- Understands industry wide trends and needs through liaison across organisations within the industry.
- Provides thought leadership on future initiatives to develop the industry such as showing how data enables better decisions, empowering a culture that views data as an asset and makes everyone see they have a role to play in data quality.
- Develops and communicating strategy at the national level.
- Plans and organises activities to help meet the goals of the industry.
- Moves the industry away from a data protective culture and encourages organisations to adopt an open-shared data culture by presenting benefits and use cases.

Collaborates with

- Organisational Leaders
- Government Bodies
- Industry Bodies
- Benefits Manager

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

COLLABORATION



- Invests time to understand objectives of external stakeholders and identifies common needs and challenges.
- Collaborates with other organisations/national institutions, sharing data to derive greater value and make strategic decisions, having the national interest in mind.
- Role models a culture of openness and sharing within the organisation.
- Builds trusting relationships both organisationally and nationally.

COMMUNICATION



- Listens deeply to understand specific business and technical challenges within and across organisations.
- Influences key stakeholders at c-suite and national level by promoting understanding on how quality data leads better and more informed decision-making.
- Translates the technical concepts of the IMF into practical, accessible language with minimal use of technical jargon.
- Tells a powerful story of the “Why” for digital transformation with passion and authenticity, using a variety of styles to maximise impact on the audience.

TRANSFORMATIONAL LEADERSHIP



- Creates a vision grounded in real world purpose at national/organisational level with clear goals which support everyone to understand and achieve the wider strategy of a digital twin and NDT.
- Champions the guidelines and protocols that govern the management of data and empowers everyone to take responsibility for these.
- Analyses current and future trends to proactively identify future talent needs for the business/national institution and puts in place plans to build capabilities required.

! Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.

Digital Skill Areas

DATA FUNDAMENTALS



- Able to challenge existing definitions of data terms, types and sources and write new definitions where applicable.
- Demonstrates knowledge of methods and tools with the ability to present new data collection and storage methods coherently.
- Makes critical decisions by understanding and synthesising high volume, high velocity or complex heterogenous data and is able to spot quality issues and recommend improvements. Enables and coaches others to make data-driven decisions.
- Consistently defines new uses and value from data and is able to articulate the steps others need to take to generate increased value from data.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT

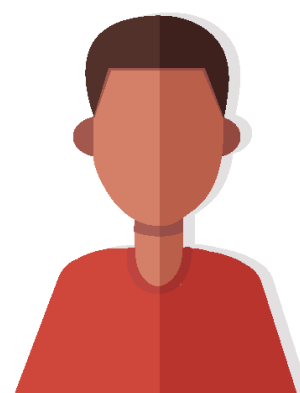


- Demonstrates the ability to analyse the detail of lifecycle inputs and outputs and can pinpoint process and data quality issues that affect outputs and suggest improvements.
- Demonstrates the ability to model descriptive and perspective cross-functional processes, emphasising quality control for data inputs and outputs and the rationale for process design.
- Evaluates the quality of data in relation to fit for purpose (business need). Suggests improvements to governance and process to improve quality.
- Demonstrates the ability to influence process modelling based on information requirements, governance and compliance procedures that must be in place.

SECURITY & ETHICS



- Understands the reasoning behind different ethical and legal standards and protocols that surround data, including its quality and use (including sharing).
- Practices secure methods when collecting and analysing data whilst showing working knowledge of how to respond to threats, vulnerabilities and risks in a way that is appropriate and proportionate - paying particular attention to surrounding organisational landscape, systems and legacy management.
- Performs business impact analysis and technology risk assessments in relation to IT policy and regulatory requirements.
- Practices good understanding of data privacy by gaining consent to use personal data and/or anonymising data when individuals could be identified.



NDT Architect

National

NEW
ROLE

Overview

Plans and designs how data across organisations, relate to each other in a way that promotes interoperability and facilitates a systems-of systems approach. They collaborate with organisations and data governance specialists to ensure individuals, government and organisations have the right access to information, in the right place, at the right time.

Responsibilities

- Main point of contact for national interoperability and sharing.
- Responsible for understanding and working with data architects and cyber security specialists to develop the right safeguards, governance and security measures to protect confidentiality, integrity and availability of data.
- Creates alignment between different organisations and listen to government data owners and business users to understand their data sharing data needs.
- Promotes integration by aggregating data and making sharing data possible.

Collaborates with

- Data Stewards
- Data Owners
- Cyber Security Specialists Architects

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

BUSINESS ANALYSIS



- Applies specialist and detailed technical expertise to analyse organisational data.
- Shows ability to identify common themes and core issues across the organisation.
- Produces workable solutions to complex organisational problems.
- Calculates and advises on risk/reward ratio of investment in data analysis and sharing.

COLLABORATION



- Invests time to understand the needs and objectives of other teams in the organisation.
- Collaborates across teams, sharing data in order to enhance team decision making.
- Shares and cascades relevant information across departments.
- Builds trusting relationships across other teams.

COMMUNICATION



- Listens and shows understanding of specific data challenges within their department or function.
- Communicates courageously upwards on the limitations of current data management and shares best practice.
- Opens a dialogue with others in the business to understand what information they need to do their jobs.
- Articulates the strategy using a compelling story to influence others on the needs of their department or function.

! Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.

Digital Skill Areas

ANALYTICS & INTELLIGENCE



- Champions the impact good quality data has on analytics and intelligence and helps process owners and modellers understand the standards for data within their part of the organisation.
- Oversees the design of algorithms, evaluating and championing ethics and advising on how they can be resiliently scaled across large data sets.
- Uses domain knowledge and industry experience to inform and influence the types of data and analysis methods that should be used to address business and industry needs.
- Is able to advise on best practice visualisation methods to present new evidence as well as being able to evaluate the quality and value of that evidence.

DATA MODELLING

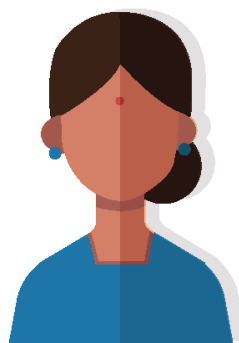


- Able to advise on industry wide ontological development using logic, philosophy, collaboration and industry knowledge.
- Able to advise on the principles of logic and philosophy that apply to taxonomies and uses automation to classify and organise data at scale.
- Able to advise on industry wide reference data models based on industry knowledge of semantics to make data interoperability automated and coherent.
- Challenges behaviours that go against data sharing and interoperability and advocates for an open data approach through architecture model design.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



- Able to challenge existing definitions of data terms, types and sources and write new definitions where applicable.
- Demonstrates knowledge of methods and tools with the ability to present new data collection and storage methods coherently.
- Makes critical decisions by understanding and synthesising high volume, high velocity or complex heterogenous data and is able to spot quality issues and recommend improvements. Enables and coaches others to make data-driven decisions.
- Consistently defines new uses and value from data and is able to articulate the steps others need to take to generate increased value from data.



Ontologist

National

NEW
ROLE

Overview

Ontologists work to determine deeper logical structures and arrangements of information. To meet the needs of the IMF, they need to have a strong understanding of philosophical ontology, what is data about and the real-world relationship it has. In other words, they need to be able to extract natural language and formalise it beyond logic in a way that is still sufficiently clear and rich.

They collaborate to define, develop and align national ontologies and data models for the built environment that facilitate integration/alignment with different ontologies.

Responsibilities

- Identifies the types of objects that properties are associated with and creates distinctions between entities and categories - between things and characteristics of things.
- Develops schemas and determines conventions with regard to how data is structured overall for both storing and sharing information.
- Develops standards that specify standard conceptual vocabularies in which to exchange data among systems, provide services for answering queries, publish reusable knowledge bases, and offer services to facilitate interoperability across multiple, heterogeneous systems and databases.

Collaborates with

- Policy Makers
- Data Stewards
- Data Curators
- Asset Managers
- Data Quality Experts
- Programmers
- Analysts

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

BUSINESS ANALYSIS



- Applies specialist and detailed technical expertise to analyse organisational data.
- Shows ability to identify common themes and core issues across the organisation.
- Produces workable solutions to complex organisational problems.
- Calculates and advises on risk/reward ratio of investment in data analysis and sharing.

COLLABORATION



- Invests time to understand objectives of external stakeholders and identifies common needs and challenges.
- Collaborates with other organisations/national institutions, sharing data to derive greater value and make strategic decisions, having the national interest in mind.
- Role models a culture of openness and sharing within the organisation.
- Builds trusting relationships both organisationally and nationally.

COMMUNICATION



- Listens deeply to understand specific business and technical challenges within and across organisations.
- Influences key stakeholders at c-suite and national level by promoting understanding on how quality data leads better and more informed decision-making.
- Translates the technical concepts of the IMF into practical, accessible language with minimal use of technical jargon.
- Tells a powerful story of the “Why” for digital transformation with passion and authenticity, using a variety of styles to maximise impact on the audience.

! Please remember this is not an exhaustive list of skills and responsibilities relating to this role – it highlights what is most important in relation to the IMF and NDT.

Digital Skill Areas

DATA FUNDAMENTALS



- Able to challenge existing definitions of data terms, types and sources and write new definitions where applicable.
- Demonstrates knowledge of methods and tools with the ability to present new data collection and storage methods coherently.
- Makes critical decisions by understanding and synthesising high volume, high velocity or complex heterogeneous data and is able to spot quality issues and recommend improvements. Enables and coaches others to make data-driven decisions.
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- Able to advise on industry wide ontological development using logic, philosophy, collaboration and industry knowledge.
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- Able to advise on industry wide reference data models based on industry knowledge of semantics to make data interoperability automated and coherent.
- Challenges behaviours that go against data sharing and interoperability and advocates for an open data approach through architecture model design.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



- Demonstrates the ability to analyse the detail of lifecycle inputs and outputs and can pinpoint process and data quality issues that affect outputs and suggest improvements.
- Demonstrates the ability to model descriptive and perspective cross-functional processes, emphasising quality control for data inputs and outputs and the rationale for process design.
- Evaluates the quality of data in relation to fit for purpose (business need). Suggests improvements to governance and process to improve quality.
- Demonstrates the ability to influence process modelling based on information requirements, governance and compliance procedures that must be in place.



Policy Maker

National

Overview

Policy Makers formulate and amend policy around data, spanning areas like privacy, sharing, ethics and security. They adapt and respond to industry needs as well as the public good. A Policy Maker is responsible for formulating or amending policy. At a national level in the UK this includes Ministers, their advisers, civil servants, officially appointed Chief Scientific Advisers, Parliamentary Committee members, MPs, Lords, and all of their advisory staff. In certain policy areas it also includes the staff of government agencies who have expert knowledge in a particular area and tend to play a role in informing the policy making process.

Responsibilities

- Aims to be supportive and quick at adapting policy to support regulators, innovation and development rather than hindering it.
- Sees data as an asset and influences organisations to adopt the same mentality.
- Undertakes or commissions research.
- Keeps up to date with social, political and economic developments and briefs others on these.
- Carries out consultations with internal and external stakeholders.
- Manages and tracks the delivery of political or organisational priorities.

Collaborates with

- Shareholders
- Management
- Trade Unions
- Customers
- Suppliers
- Communities

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

ADAPTABILITY



- Drives a continuous learning culture within the organisation or national institution.
- Creates resilient strategies and operations.
- Creates a safe environment where others can talk openly about personal strengths and development needs in order to improve.
- Champions innovation across the organisation and/or nationally.

COLLABORATION



- Invests time to understand cross functional objectives, KPIs and how they interrelate.
- Collaborates cross functionally with the big picture in mind to enhance strategic decision making.
- Encourages and facilitates the sharing of data cross functionally to optimise decision making.
- Builds trusting relationships across the entire organisation.

COMMUNICATION



- Listens deeply to understand specific business and technical challenges within and across organisations.
- Influences key stakeholders at c-suite and national level by promoting understanding on how quality data leads better and more informed decision-making.
- Translates the technical concepts of the IMF into practical, accessible language with minimal use of technical jargon.
- Tells a powerful story of the “Why” for digital transformation with passion and authenticity, using a variety of styles to maximise impact on the audience.

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Digital Skill Areas

DATA FUNDAMENTALS



- Able to challenge existing definitions of data terms, types and sources and write new definitions where applicable.
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- Consistently defines new uses and value from data and is able to articulate the steps others need to take to generate increased value from data.

LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



- Able to advise on best practices for lifecycle management to improve process and the quality of data outputs. Can predict potential data quality risks and issues with lifecycles and suggest mitigation.
- Models lifecycle processes that consider internal and external events, actions and connection points. Makes critical decisions on process improvements to reduce waste and improve data quality and integration.
- Able to demonstrate the impact fit for purpose data has on decision making and value. Works with others to set standards, governance and targets for data quality in relation to the purpose it serves.
- Inspires teams to develop process and information requirements with the end in mind, focusing on what decisions need answering and working backwards to map data flows.

SECURITY & ETHICS



- Defines best practice for standards and protocols and sets tasks and targets in relation to legal compliance, governance procedures and business integrity. Acts as the final point of escalation for non-compliance.
- Actively drives a secure by design approach to choosing, using and designing technology. Raises awareness of security mindedness to encourage leaders, managers and individuals to play their part in recognising threats, minimising risks, complying with policies and processes, and responding to incidents or breaches.
- Promotes continuous assessment of cyber security risk and resilience by ensuring penetration testing is performed to ensure business continuity and legal obligations are met. Stays up to date with hacking methods to recommend technology and processes to prevent attacks.
- Advocates for individual awareness of data privacy measures and promotes ethical considerations that puts control back in the hand of the individual for the public good.



Sector Regulator

National

Overview

In relation to the IMF and NDT, Sector Regulators take on an information planning role to identify information requirements for effective oversight of the sector.

They work with other national regulators, specifically data, legal and security regulators to inform what the industry needs in order to do to be nationally complaint and deliver industry or sector-wide benefits.

Responsibilities

- Investigates existing processes within the sector in terms of data governance and collaborates to inform better practices.
- Works with process owners to understand the information needed at a sector level to support decision making and collaborates with a variety of sector roles to define quality requirements and associated standards. The aim of this is to facilitate sharing where appropriate to meet identified (and justified) requirements.
- Assesses the sector's quality, ethical and safe use of data to build an understanding of maturity levels, risk and inform best practice.

Collaborates with

- Policy Makers
- Industry Leaders
- Data Regulators
- Security Regulators
- Legal Regulators

The skills represented here are the 6 key skills needed, more can be found on the [individual competency scorecards](#).

Business Skill Areas

COLLABORATION



- Invests time to understand objectives of external stakeholders and identifies common needs and challenges.
- Collaborates with other organisations/national institutions, sharing data to derive greater value and make strategic decisions, having the national interest in mind.
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TRANSFORMATIONAL LEADERSHIP



- Creates a vision grounded in real world purpose at national/organisational level with clear goals which support everyone to understand and achieve the wider strategy of a digital twin and NDT.
- Champions the guidelines and protocols that govern the management of data and empowers everyone to take responsibility for these.
- Analyses current and future trends to proactively identify future talent needs for the business/national institution and puts in place plans to build capabilities required.

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Digital Skill Areas

DATA FUNDAMENTALS



- Able to challenge existing definitions of data terms, types and sources and write new definitions where applicable.
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LIFECYCLE ASSURANCE & QUALITY MANAGEMENT



- Able to advise on best practices for lifecycle management to improve process and the quality of data outputs. Can predict potential data quality risks and issues with lifecycles and suggest mitigation.
- Models lifecycle processes that consider internal and external events, actions and connection points. Makes critical decisions on process improvements to reduce waste and improve data quality and integration.
- Able to demonstrate the impact fit for purpose data has on decision making and value. Works with others to set standards, governance and targets for data quality in relation to the purpose it serves.
- Inspires teams to develop process and information requirements with the end in mind, focusing on what decisions need answering and working backwards to map data flows.

SECURITY & ETHICS



- Able to author internal organisational ethical and governance standards and protocols. Acts as the first point of escalation for non-compliance.
- Able to articulate security and ethical design requirements and recommend measures to ensure systems stay secure and prevent threats, vulnerabilities and risks and protect against the loss of valuable commercial information, personal data and intellectual property.
- Able to analyse risk and perform steps to manage crisis issues and develop and implement continuity and recovery plans.
- Can justify the use of personal or sensitive data when challenges on business, ethical and legal grounds.

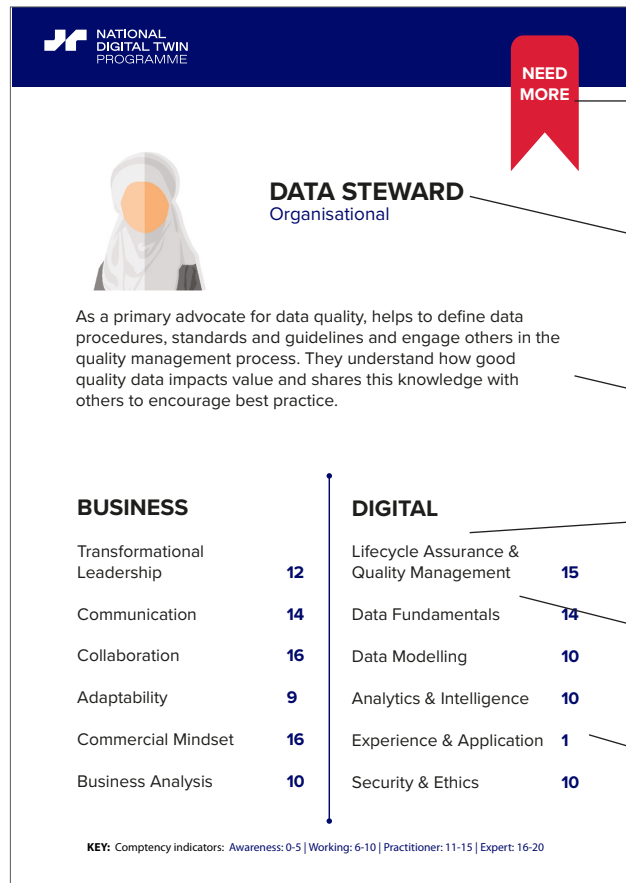
Tools

Take action, get talking

Get people in your organisation talking about the skills and roles needed to develop digital twins and adopt the IMF, to help deliver the National Digital Twin.

You can **download** and **print** these competency scorecards plus all the additional roles mentioned on “List of roles” on page 45 to:

- Identify skill and competency gaps more efficiently in a collaborative activity.
- Build cross functional teams and understand strengths and weaknesses to ensure you get the right mix of roles and skills to support your needs.
- Develop a resource plan and pipeline of skills needed over a specific time frame to drive intervention.



Represents if this is a new role or if we need more

Represents if this is an organisational or national role

Role overview and high level responsibilities

Skill type (business or digital)

Represents a skill area

Score relating to competency level: Awareness, Working, Practitioner and Expert as identified by the key

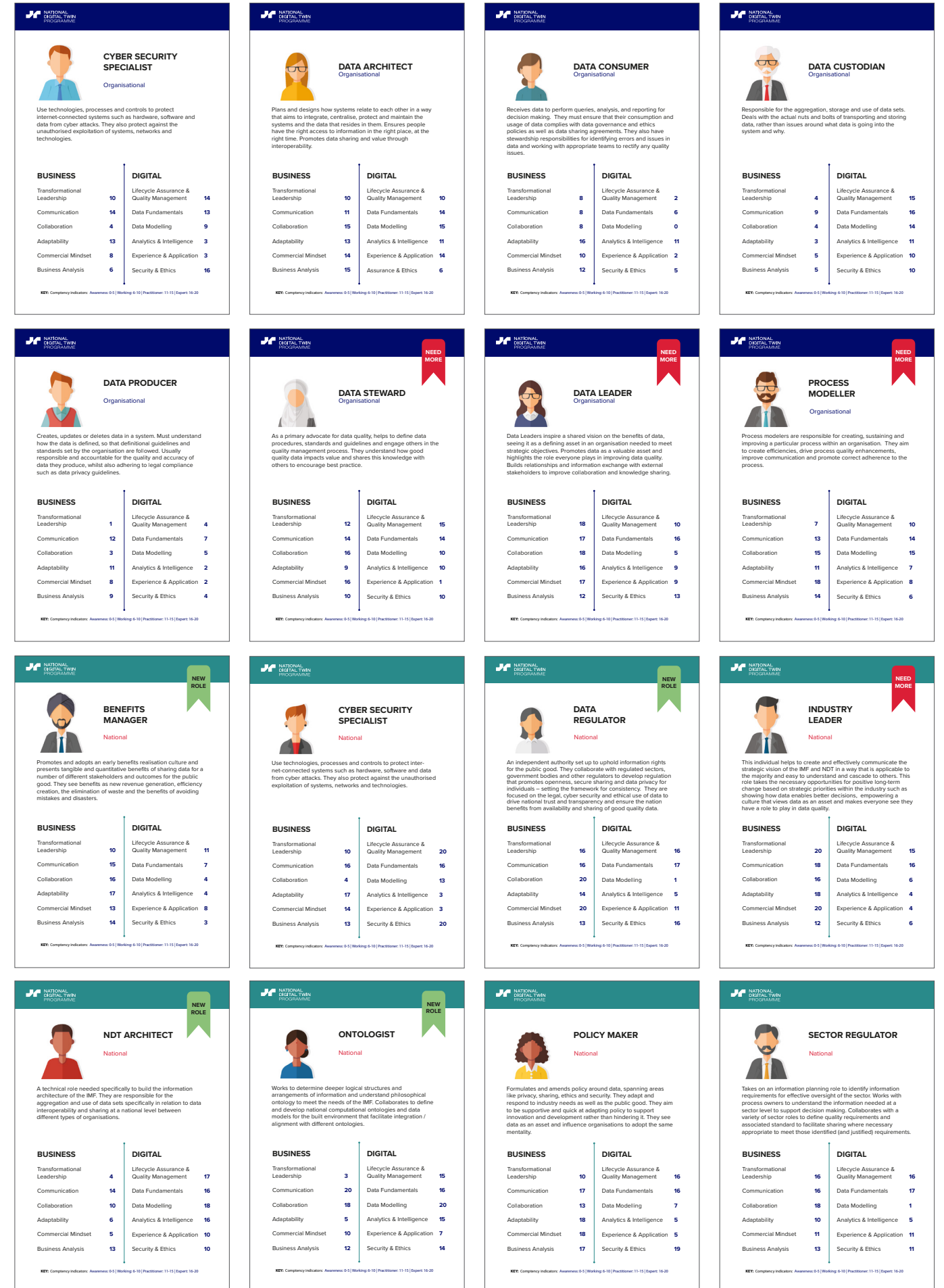
KEY: Competency indicators

Awareness: 0-5

Working: 6-10

Practitioner: 11-15

Expert: 16-20



Appendix

Definitions

Competency - A skill applied in a particular context through behaviours expressed in a measurable way.

Competency indicators - Each competency level is measured using a set of indicators, which are descriptions of the skill in practice.

Data quality - Data that is fit for the purposes and context in which it will be used.

Digital - A way of working that captures and uses data, in combination with technologies, devices, systems, processes and/or methods, to generate, manage and/or share information.

Digital twin - Combines data describing the physical in a digital format. Within the built environment, a digital twin is a realistic digital representation of assets, processes and systems

Foundational Data Model (FDM) - A consistent, clear ontology for the digital twin ecosystem: a structure for sharing and validating data.

Integration Architecture (IA) - Design and build of the digital systems that manage the connected digital twins: the glue that links twins together.

Information Management Framework (IMF) - The technical rulebook and handbook to develop a Data Commons to connect digital twins nationally by an FDM (relationship creator, ontology and taxonomy), RDL (definitions) and IA (integration).

National Digital Twin (NDT) - An ecosystem of digital twins and the protocols by which they can be integrated securely and resiliently to create a data-led approach to making decisions.

National Roles - The specific name given to a grouping of tasks and responsibilities performed by an individual at the national level. They are typically responsible for influencing and advising the industry.

Organisational Roles - The specific name given to a grouping of tasks and responsibilities performed by an individual at the organisational level. They are typically responsible for influencing and advising their own organisation and adopting national guidelines.

Reference Data Library (RDL) - Common references or vocabulary that enable the secure sharing of high-quality data: the common language for describing digital twins.

Security Mindedness - Understanding and routinely applying appropriate and proportional security measures in any business situation to deter and/or disrupt hostile, malicious, fraudulent and criminal behaviours or activities. It is a holistic approach, taking into consideration personnel, physical cyber and cross-cutting security overseen by good governance with clear line of responsibility and accountability.

Skill - A specific learned ability required to perform a role successfully.

Skill Family - A specified grouping of individual skills

Methodology

Process design - The process began by developing a shared understanding between key stakeholders of the purpose of the inquiry, key terms of reference, and required outputs. The objective was to create a framework outlining targeted role-based skills and competencies needed to design and operate the National Digital Twin.

Research on existing frameworks - A meta analysis of existing skills and competency frameworks was conducted which enabled the extrapolation of common themes across a diverse set of industries. From the research of what exists currently, several options were formulated and proposed in order to test underpinning architecture and design of desired final output.

Data collection - Questionnaire - A survey was created to collect data from a wide range of stakeholders and subject matter experts to gain insight into the extent to which skills identified in the meta-analysis were required to design and operate a NDT. Priority technical and non-technical skills were selected based on responses to take forward to focus groups with stakeholders and SMEs.

Data collection - Focus groups and interviews - Responses from these focus groups were thematically analysed and divided into competencies and sub-competencies underpinned by behavioural indicators. These were outlined at an awareness, working, practitioner and expert level.

Framework development and testing - Feedback from the focus groups was used to outline key roles at both a national and organisational level. From here, competency scorecards were designed for each key role including allocating scores out of 20 (0-5 = awareness, 6-10 = working, 11-15 = practitioner, 16-20 = expert) for each competency. The developed output was distributed to a wide group of stakeholders for their feedback.

Gap Analysis - A number of organisational and national stakeholders were invited to participate in a series of interviews to review and validate the work in progress and comment on the extent to which gaps existed within their own organisations (or across industry in the case of national stakeholders) in relation to the roles and skills outlined in the Framework.

Framework finalisation - The Framework was then finalised and issued to a wider group of stakeholders including CDBB workstream leads and members of the Digital Twin Hub for their comments to help refine the final output.

Appendix

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Contributors

Industry Subject Matter Experts:

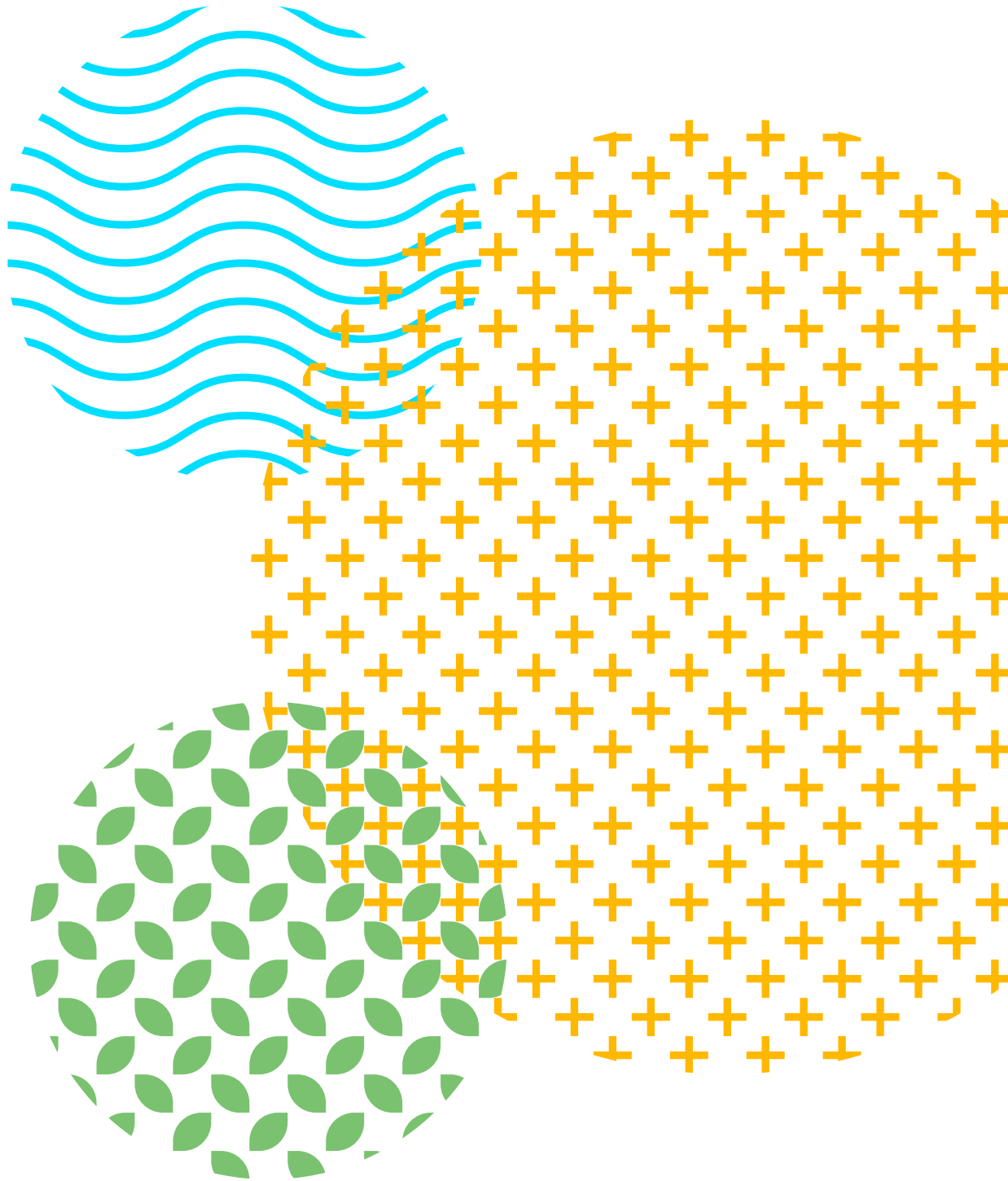
Al Cook, Ali Nicholl, Andy Boutle, Angela Brown, Anne Kemp, Brendan Kelly, Damien McCloud, Daniel Braund, David McKeown, Didem Gurdur Broo, Erwin Frank-Schultz, Graham Bleakley, James Harris, James Hetherington, Jennifer Schooling, Karen Wood, Kevin Reeves, Mark Enzer, Mark Gaskarth, Mathew Brett, Matthew West, Miranda Sharp, Neil Thompson, Nicola Pearson, Paul Campion, Paul Hodgson, Paul May, Paul Reilly, Peter Curtis, Peter El Hajj, Peter Vale, Sam Chorlton, Sarah Hayes, Simon Evans, Simon Frampton, Tom Oulton,

Gap Analysis Interview Participants:

BT: Gilbert Owusu, Louise Krug
Construction Innovation Training Board (CITB): Marcus Bennett
Cambridgeshire County Council: Daniel Clarke
Connect Plus Services: Adam Talbot, David Wilson
Greater London Authority: Alan Lewis, Ananya Jaidev, Helen Markides
Anglian Water: Guy Gregory, Matt Edwards, Melissa Tallack, Peter Fleming, Robert Shaw
Sellafield Ltd: Neil Picthall

Authors:

Mott MacDonald – Andrew Moulds, Ashleigh Monagle, David Plummer, Hannah Collins, Jamie Robertson, Marta Mroczka, Sean Kearney, Victoria Perry
Lane4 – Clementine Lewis, Seren Trewavas, Tom Smith



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