

FRAMEWORK DOCUMENT

Digital Competence Framework for Construction



May 2024



Overview

The Digital Competence Framework for Construction aims to provide guidance for the key digital skills that are required for work in a construction role. Using the scale of digital competency as a starting point from the **Unlocking Construction's Digital Future: A skills plan for industry report**.¹ The common digital skills are based upon **The Digital Competence Framework for Citizens**² and the **DigComp at Work report**³ which aims to outline the level of skill, knowledge and behaviours that the different levels of occupation require. We also included content from the **Centre for Digital Built Britain's Skills and Competency Framework**.⁴

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1. https://www.citb.co.uk/media/0pkin1nj/citb_constructions_digital_future_report_oct2018.pdf
 2. Vuorikari, R., Kluzer, S. and Punie, Y., DigComp 2.2: The Digital Competence Framework for Citizens, EUR 31006 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-48882-8, doi:10.2760/115376, JRC128415.
 3. Kluzer S., Centeno C. and O'Keeffe, W., DigComp at Work, EUR 30166 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-22558-4, doi:10.2760/17763, JRC120376
 4. Plummer D, Kearney S, Monagle A, Collins H, Perry V, et al. (2021). Skills and Competency Framework - Supporting the development and adoption of the Information Management Framework (IMF) and the National Digital Twin doi.org/10.17863/CAM.52659



For the purpose of this framework a Digital Skill is defined as the ability to find, evaluate, use, share, create content and make decisions using digital tools and services.

A Digital tool is something physical that is used.

A Digital system is something on a phone/ computer that someone directly interacts with (an app for example).

A Digital service is something that is remote and delivered over the internet or electronic network.

Knowledge of a tool, system or service before you can use it competently and as part of a digital skill is a pre-requisite.

To use, take the Digital Competence Grid, provided separately to this document, to identify the skill and level of skill required for a particular role. Then, find the corresponding set of statements in the grids below. The bodies of knowledge included in this document are as follows:

Digital literacy, information and communication

- Safety and security
- Design and development, problem solving
- Data capture, analysis and insight
- Modelling and simulation
- Smart construction and built assets

Each body of knowledge is broken down into a number of sections and each section has its own set of statements on a scale as follows:

- Default Users
- Competent Users
- Mindful Operators
- Selective Generalists
- Skilled Innovators

This framework is to be used as a guide as all roles will vary across employers and sites. Not all bodies of knowledge may be relevant at this time and this framework will be continually revised as more digital technologies are embraced by the construction sector and as technologies evolve.



1. Digital Literacy, Information & Communication

1.1 Browsing, searching and filtering data, information and digital content

To articulate information needs, to search for data, information and content in a digital environment, to access them and to navigate between them. To create and update personal search strategies.

1.2 Evaluating and managing data, information and digital content

To analyse, interpret, compare and critically evaluate the credibility and reliability of data, information and digital content. To organise, store and retrieve data, information and content in structured, digital environments.

1.3 Interacting through digital technologies

To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.

1.4 Sharing through digital technologies

To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices.

1.5 Engaging and collaborating through digital technologies

To engage through the use of public and private digital services. To seek opportunities for self-empowerment through appropriate digital technologies. To use digital processes, and for co-construction and co-creation of data, resources and knowledge.

1.6 Netiquette

To be aware of behavioural norms and know-how whilst using digital technologies and interacting within digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.

1.7 Managing Digital Identity

To create, and manage one or multiple digital identities, to be able to protect themselves and their company's reputation, to deal with the data produced through digital tools, environments and services.

1.8 Identifying digital competence gaps

To understand where their digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up to date with the digital evolution



2. Safety & Security

2.1 Protecting devices

To protect devices and digital content, and to understand the risks and threats in digital environments. To know about safety and security measures and to have a due regard to reliability and privacy.

2.2 Protecting data and privacy

To protect both personal and company data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect themselves and others from damages. To understand that digital services use a Privacy Policy to inform how personal data is used.

2.3 Protecting health, wellbeing and the environment

To be able to avoid health risks and threats to physical wellbeing while using digital technologies. To be able to protect themselves and others from possible dangers in digital environments. To be aware of digital technologies for social wellbeing and social inclusion. To be aware of the environmental impact of digital technologies and their use.

2.4 Security and Ethics ⁵

To be aware of the ethical and legal standards when using data and to understand the purpose of the data that you are working with.

3. Design & Development, Problem Solving

3.1 Identifying needs and technological responses

To assess needs and to identify, evaluate, select and use digital tools and possible technological responses and to solve them.

3.2 Solving digital technology problems and programming

To identify technical problems when operating devices and using digital environments, and to plan and develop a sequence of understandable instructions to solve a given problem or to perform a specific task.

3.3 Developing, integrating and re-elaborating digital content

To create and edit digital content in different formats, to express the proposed content through digital means. To modify, refine and integrate new information and content into an existing body of knowledge and resources to create new, original and relevant content and knowledge.

3.4 Copyright and licences

To understand how copyright and licences apply to digital information and content.

3.5 Creatively using digital technologies

To use digital tools and technologies to create knowledge and to innovate processes and products.

5. DT indicates where content has been reused from the Centre for Digital Built Britain's Skills and Competency Framework: Plummer D, Kearney S, Monagle A, Collins H, Perry V, et al. (2021). Skills and Competency Framework - Supporting the development and adoption of the Information Management Framework (IMF) and the National Digital Twin doi.org/10.17863/CAM.52659

4. Data Capture, Analysis & Insight

4.1 Using data sets

To understand the difference between raw data and manipulated data. To know where data has come from and its intended purpose. To identify trends, analyse and draw conclusions from the data.

4.2 Capturing data using hardware

To know how to capture the required data using hardware and digital tools to gather accurate, real-time data to feed back to digital systems.

4.3 Data Fundamentals^{DT}

To know what good quality data looks like and be able to articulate the purpose and value of using it, whilst recognising how to generate value and making decisions with it.

4.4 Analytics and intelligence^{DT}

To know what good quality data looks like and its ability to be analysed. To draw insight from data in the form of visual communication that others are receptive to. To use statistical, practical and ethical methods to design and enhance algorithms.

Also relevant to Data Capture, Analysis and Insight:

1.4 Interacting through digital technologies (see section 1)

1.5 Sharing through digital technologies (see section 1)

5. Modelling & Simulation

5.1 Data Modelling^{DT}

To understand how to build data that can be exposed and integrated with other external systems. To use reference data models to make organisable data models relevant to real world application. To recognise the concepts in relation to their broader impact on data sharing and interoperability.

5.2 Capturing high quality images using digital technologies

To know how to take high-quality images using appropriate digital technologies. To be aware of the requirements and how the high-quality images will be used to inform other processes.

5.3 The Golden Thread of information

To be aware of the importance of building to provided specifications. To know how to use digital tools and

services to access specification and manufacturers information. To know how to create, obtain, store and share the relevant information in a digital format.

5.4 Gathering experience and application information^{DT}

To demonstrate an understanding of user interface design, facilitation and people, to gather experiences and feedback from the end users. To make technology more applicable and accessible for those required to use it.

Also relevant to Modelling and Simulation:

3.1 Identifying needs and technological responses (see section 3)

3.6 Programming (see section 3)

3.5 Creatively using digital technologies (see section 3)

6. Smart Construction & Built Assets

6.1 Incorporating sensors into buildings, equipment and onto people

To know what sensors can do and how they can be of benefit to those working on a construction site. To know sensors can send readings to digital systems to warn individuals of potential dangers on site. To know where to place sensors in buildings, equipment and onto people to gather the required data.

6.2 Using Telematics

To know what telematics can do to help keep machinery running and manage the use and maintenance of machinery onsite. To know what else telematics can do and the insight it can give to managing multiply sites and resources.

Also relevant to Smart Construction & Built Assets

Interacting through digital technologies (see section 1)
1.5 Sharing through digital technologies (see section 1)



1. Information & Digital Literacy

1.1 Browsing, searching and filtering data, information and digital content

To articulate information needs, to search for data, information and content in digital environment, to access them and to navigate between them. To create and update personal search strategies.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> • identify information needs • find data, information and content through a simple search in digital environments • find how to access this data, information and content and navigate between them • identify simple search strategies
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> • explain information needs • perform well-defined and routine searches to find data, information and content in digital environments • explain how to access them and navigate between them • explain well-defined and routine search strategies
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> • illustrate information needs • organise the searches of data, information and content in digital environments • describe how to access this data, information and content, and navigate between them • organise search strategies
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> • guide others • assess and respond to information needs • apply searches to obtain data, information and content in digital environments • adapt searching strategy to find the most appropriate data, information and content in digital environments • explain how to access this data, information and content and navigate between them • propose and vary search strategies
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> • create solutions to complex problems with limited definition and many interacting factors that are related to browsing, searching and filtering of data, information and digital content • integrate my knowledge to contribute to professional practice and knowledge and guide others in browsing, searching and filtering data, information and digital content • propose new ideas and processes to the field

1.1 Browsing, searching and filtering data, information and digital content (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Knows that some online content in search results may not be open access or freely available and may require a fee or signing up for a service in order to access it.
- Aware that online content that is available to users at no monetary cost is often paid for by advertising or by selling the user's data.
- Aware that search results, social media activity streams and content recommendations on the internet are influenced by a range of factors. These factors include the search terms used, the context (e.g. geographical location), the device (e.g. laptop or mobile phone), local regulations (which sometimes dictate what can or cannot be shown), the behaviour of other users (e.g. trending searches or recommendations) and the user's past online behaviour across the internet.
- Knows how to improve browser performance.
- Knows what is meant by search engine optimisation.
- Knows methods to improve search engine ranking and the impact this has on search results.
- Aware that search engines, social media and content platforms often use AI algorithms to generate responses that are adapted to the individual user (e.g. users continue to see similar results or content). This is often referred to as "personalisation".
- Aware that AI algorithms work in ways that are usually not visible or easily understood by users. This is often referred to as "black box" decision-making as it may be impossible to trace back how and why an algorithm makes specific suggestions or predictions.



Skills

- Can choose the search engine that most likely meets information needs as different search engines can provide different results even for the same query.
- Can improve search results by using a search engine's advanced features (e.g. specifying exact phrase, language, region, date last updated).
- Can make use of information presented as hyperlinks, in non-textual form (e.g. flowcharts, knowledge maps) and in dynamic representations (e.g. data).
- Can rate online information against search criteria.
- Able to submit requests for annual leave, record absence from work or submit expenses claims online.
- Able to review their own payslip and salary payments when received digitally.
- Develops effective search methods for professional purposes (e.g. to find appropriate suppliers).
- Able to search and source relevant documentation online (e.g. instruction manual for a piece of equipment).
- Able to handle information overload and "infodemic" (i.e. increase of false or misleading information during a disease outbreak) by adapting search methods and strategies.



Behaviours

- Intentionally avoids distractions and aims to avoid information overload when accessing and navigating information, data and content.
- Values tools designed to protect search privacy and other rights of users.
- Weighs the benefits and disadvantages of using AI-driven search engines (e.g. while they might help users find the desired information, they may compromise privacy and personal data, or subject the user to commercial interests).
- Concerned that some online information and content may not be accessible to people with a disability, for example to users who rely on screen reader technologies to read aloud the content of a web page.

1.2 Evaluating and managing data, information and digital content

To analyse, interpret, compare and critically evaluate the credibility and reliability of data, information and digital content. To organise, store and retrieve data, information and content in structured, digital environments.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> • detect the credibility and reliability of common sources of data, information and their digital content • identify how to organise, store and retrieve data, information and content in a simple way in digital environments
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> • compare and evaluate the credibility and reliability of well-defined sources of data, information and digital content • analyse, interpret and evaluate well-defined data, information and digital content • select data, information and content in order to organise, store and retrieve them in a routine way in digital environments
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> • analyse, compare and evaluate sources of data, information and digital content • analyse, interpret and evaluate data, information and digital content • organise information, data and content to be easily stored and retrieved in a structured environment
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> • guide others • critically analyse the credibility and reliability of sources of data, information and digital content • critically analyse data, information and digital content • manipulate information, data and content for their easier organisation, storage and retrieval • adapt the management of information, data and content for the most appropriate retrieval and storage in a structured environment
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> • create solutions to solve complex problems with limited definition and with many interacting factors that are related to analysing and evaluating credible and reliable sources of data, information and content in digital environments • integrate my knowledge to contribute to professional practices and knowledge and to guide others in the analysis and evaluation of the credibility and reliability of data, information and digital content and their sources • create solutions to solve complex problems with limited definition and many interacting factors that are related to managing data, information, and content for their organisation, storage and retrieval in a structured digital environment • integrate my knowledge to contribute to professional practices and knowledge and to guide others in managing data, information and digital content in a structured digital environment • propose new ideas and processes to the field

1.2 Evaluating and managing data, information and digital content (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Aware that online environments contain all types of information and content including misinformation and disinformation, and even if a topic is widely reported it does not necessarily mean it is accurate.
- Knows the importance of identifying who is behind information found on the internet and verifying it by checking multiple sources, to help recognise and understand point of view or bias behind particular information and data sources.
- Aware of potential information biases caused by various factors (e.g. data, algorithms, editorial choices, censorship, their personal limitations).
- Knows that the term “deep-fakes” refers to AI-generated images, videos or audio recordings of events or persons that did not really happen (e.g. speeches by politicians). They may be impossible to distinguish from the real thing.
- Aware that the data, on which AI depends, may include biases. If so, these biases can become automated and worsened by the use of AI (e.g. search results about occupation may include stereotypes about male or female jobs)
- Aware that for data (e.g. numbers, text, images, sounds) to be processed by a program, they have to be first properly digitised (i.e. digitally encoded).
- Aware that sensors used in many digital technologies and applications generate large amounts of data, including personal data, that can be used to train an AI system.
- Knows that open data repositories exist where anyone can get data to support some problem-solving activities.



Skills

- Able to differentiate sponsored content from other content online (e.g. recognising advertisements and marketing messages on social media or search engines) even if it is not marked as sponsored.
- Able to analyse and critically evaluate search results and social media activity streams, to identify their origins, to distinguish fact-reporting from opinion, and to determine whether outputs are truthful or have other limitations (e.g. economic, political, religious interests).
- Able to find the author or the source of the information, to verify whether it is credible (e.g. an expert or authority in a relevant discipline).
- Can differentiate between different types of storage locations (local devices, local network, cloud) and which are the most appropriate to use.
- Able to collect digital data using basic tools such as online forms and present them in an accessible way.
- Can apply basic statistical procedures to data in a structured environment (e.g. spreadsheet) to produce graphs and other visualisations (e.g. charts).
- Can use data tools (e.g. databases, data mining, analysis software) designed to manage and organise complex information, to support decision-making and solving problems.
- Can manage information, data and content in line with data protection regulations (e.g. setting expiry dates on data, safe deletions).



Behaviours

- Carefully considers the possible outcome before clicking a link.
- Willing to fact-check a piece of information and assess its accuracy, reliability and authority, while favouring primary sources over secondary sources of information where possible.
- Considers transparency when manipulating and presenting data to ensure reliability, and spots data that is expressed in misleading ways.
- Watchful of accuracy when evaluating sophisticated representations of data.




1.3 Interacting through digital technologies

To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · select simple digital technologies to interact · identify appropriate simple communication means for a given context
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · perform well-defined and routine interactions with digital technologies · select well-defined and routine appropriate digital communication means for a given context
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · select a variety of digital technologies to interact · select a variety of appropriate digital communication means for a given context
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · use a variety of digital technologies in order to interact · show others the most appropriate digital communication means for a given context · adapt a variety of digital technologies for the most appropriate interaction · adapt the most appropriate communication means for a given context
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with limited definition and many interacting factors that are related to interacting through digital technologies and digital communication means · integrate my knowledge to contribute to professional practices and knowledge and to guide others in the interaction through digital technologies · propose new ideas and processes to the field

1.3 Interacting through digital technologies (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows that using digital collaboration technologies can improve efficiency on construction sites• Knows that many communication services (e.g. instant messaging) and social media are free of charge because they are partly paid for by advertising and monetising user data.• Aware which communication tools and services (e.g. phone, email, video conference, social network, podcast) are appropriate in specific circumstances (e.g. synchronous, asynchronous), depending on the audience, context and purpose of the communication.• Aware that some tools and services also provide an accessibility statement.• Aware of the need to formulate messages in digital environments so that they are easily understandable by the targeted audience or the recipient.• Knows how to access information from a QR code, NFC or RFID tag to get the most up to date information on a particular product.
 <p>Skills</p>	<ul style="list-style-type: none">• Able to use digital collaboration tools to meet with, share and collaborate with colleagues and clients.• Able to effectively communicate in asynchronous (non-simultaneous) mode using digital tools (e.g. for reporting and briefing, sharing ideas, giving feedback and advice, scheduling meetings, communicating milestones).• Can use digital tools for informal communication with colleagues in order to develop and maintain social relations.• Can use digital tools to formally communicate with peers, senior colleagues, and specialists on a professional level.• Able to use a variety of videoconferencing features (e.g. moderating a session, recording audio and video).• Can identify signs that indicate whether they are communicating with a human or an AI-based conversational agent (e.g. when using text- or voice-based chatbots).• Considers the need to balance asynchronous and synchronous communication activities (e.g. to minimise video conferencing fatigue, to respect co-workers time and preferred working hours).• Able to scan a QR code, NFC or RFID tag to locate the details including specifications, installation and maintenance information.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Open to using systems that improve efficiency and aid accuracy and safety on a construction site.• Willing to listen to others and to engage in online conversations with confidence, clarity and reciprocity in work contexts.• Open to AI systems supporting humans to make informed decisions in accordance with their goals (e.g. users actively deciding whether to act upon a recommendation or not).• Willing to adapt an appropriate communication strategy depending on the situation and digital tool: verbal strategies (written, oral language), non-verbal strategies (body language, facial expressions, tone of voice), visuals strategies (signs, icons, illustrations) or mixed strategies.• Inclined to put safety first and find installation and specification information via QR codes, NFC or RFID tags located on products

1.3 Sharing through digital technologies

To share data, information and digital content with others through appropriate digital technologies. To act as intermediary, to know about referencing and attribution practices.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> recognise simple appropriate digital technologies to share data, information and digital content identify simple referencing practices
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> select well-defined and routine appropriate digital technologies to share data, information and digital content explain how to act as an intermediary for sharing information and content through well-defined and routine digital technologies illustrate well-defined and routine referencing and attribution practices
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> manipulate appropriate digital technologies to share data, information and digital content explain how to act as an intermediary for sharing information and content through digital technologies illustrate referencing and attribution practices
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> guide others share data, information and digital content through a variety of appropriate digital tools show others how to act as an intermediary for sharing information and content through digital technologies apply a variety of referencing and attribution practices assess the most appropriate digital technologies to share information and content adapt my intermediation role vary the use of the more appropriate referencing and attribution practices
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> create solutions to solve complex problems with many interacting factors that are related to sharing through digital technologies integrate my knowledge to contribute to professional practices and knowledge and guide others in sharing through digital technologies propose new ideas and processes to the field

1.4 Sharing through digital technologies (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Understands that permanent records are produced by online activity that can be accessed by others.
- Aware that everything shared publicly online (e.g. images, videos, sounds) can be used to train AI systems. For example, commercial software companies who develop AI facial recognition systems can use personal images shared online (e.g. family photographs) to train and improve the software's capability to automatically recognise those persons in other images, which might not be desirable.
- Understands data sharing principles and ownership and copyrights of digital content.
- Knows the role and responsibilities of the online facilitator to structure and guide a discussion group (e.g. how to act as an intermediary when sharing information and digital content in digital environments).
- Aware of services such as GS1 Standards which use barcodes and tags to capture and exchange vital supply chain information about products, locations and assets.



Skills

- Able to share digital content (e.g. pictures) across multiple devices (e.g. from smartphones to cloud services).
- Able to share and show information from their work device (e.g. show graphs from a laptop) to support a message being conveyed during a real time online session (e.g. video conference).
- Able to select and restrict with whom the content is shared (e.g. allowing only co-workers to read and comment).
- Can curate content on content sharing platforms so as to add value for themselves and others (e.g. shares comments on online services).
- Can acknowledge the original source and authors of shared content.
- Able to flag or report disinformation and misinformation to fact-checking organisations and to social media platforms in order to stop it spreading.



Behaviours

- Willing to share expertise on the internet, for example through intervening in online forums, or through sharing of resources.
- Open to using codes on products to access important manufacturer information and to share that information with others.
- Open towards sharing digital content that might be beneficial and useful to others.
- Inclined not to share digital resources if not able to cite their author or source in an appropriate manner.

1.4 Engaging and collaborating through digital technologies


To engage through the use of public and private digital services. To seek opportunities for self-empowerment through appropriate digital technologies. To use digital processes, and for co-construction and co-creation of data, resources and knowledge.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify simple digital services in order to participate at work · recognise simple appropriate digital technologies to empower myself and to participate in the workplace · use simple digital tools and technologies for collaborative processes
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · select well-defined and routine digital services in order to participate at work · indicate well-defined and routine appropriate digital technologies to empower myself and to participate in the workplace · select well-defined and routine digital tools and technologies for collaborative processes
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · select digital services in order to participate at work · discuss appropriate digital technologies to empower myself and to participate in the workplace · select digital tools and technologies for collaborative processes
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · propose different digital services, tools and technologies to participate at work and collaborative processes · use appropriate digital technologies to empower myself and to participate in the workplace · vary the use of the most appropriate digital services, tools and technologies to participate at work and collaborative processes · vary the use of the most appropriate digital technologies to empower myself and to participate in the workplace · choose the most appropriate digital tools and technologies for co-constructing and co-creating data, resources and knowledge

<p>Skilled Innovators</p>	<p>At skilled innovator level, I can:</p>	<ul style="list-style-type: none"> • create solutions to solve complex problems with many interacting factors that are related to engaging in work through digital technologies • integrate my knowledge to contribute to professional practices and knowledge and guide others in engaging in work through digital technologies • vary the use of the most appropriate digital tools and technologies for collaborative processes • choose the most appropriate digital tools and technologies for co-constructing and co-creating data, resources and knowledge • create solutions to solve complex problems with many interacting factors that are related to using collaborative processes and co-construction and co-creation of data, resources and knowledge through digital tools and technologies • propose new ideas and processes to the field
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1.5 Engaging and collaborating through digital technologies (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none"> • Knows about different types of digital services available on the internet: public ones (e.g. services to consult tax information or make an appointment in the health care centre), community-based services (e.g. map services such as Open Street Map) and private services (e.g. e-commerce, online banking). • Knows that a secure electronic identification, (e.g. identity cards which contain digital certificates such as Smartcards), enables people to increase safety. • Recognises that while the application of AI systems in many domains is usually uncontroversial (e.g. AI that helps avert climate change), AI that directly interacts with humans and takes decisions about their life can often be controversial (e.g. CV-sorting software for recruitment procedures). • Aware of the advantages of using digital tools and technologies for remote collaborative processes (e.g. reduced commuting time, joining specialised skills together regardless of location). • Understands that in order to co-create digital content with other people, good social skills (e.g. clear communication, ability to clarify misunderstandings) are important to compensate for the limitations of online communication. • Understanding of virtual team dynamics, including team building, fostering trust and cohesion, resolving conflicts, and building relationships with remote team members across different time zones and cultures.
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Skills

- Able to use software systems to clock in/ confirm attendance on site.
- Able to access their Smartcard credentials from a certification authority for the purpose of a secure electronic identification (e.g. CSCS card details).
- Can engage with others through digital technologies for the sustainable development of work (e.g. create opportunities for joint action across the construction sector to meet sustainability challenges) with an awareness of technology's potential for both inclusion, participation and exclusion.
- Able to use digital tools to facilitate and improve collaborative processes, for example through shared visual boards.
- Can evaluate the advantages and disadvantages of digital applications for making collaboration effective (e.g. the use of online spaces for co-creation, shared project management tools).
- Can facilitate virtual meetings, including agenda setting, time management, encouraging participation, managing discussions, and summarizing key points and action items.



Behaviours

- Open to change their own administrative routines at work and adopt digital procedures when dealing other services.
- Readiness to contemplate ethical questions related to AI systems (e.g. in placing sensors onto people to monitor movements around a site).
- Proactive about using the internet and digital technologies to seek opportunities for constructive participation in decision-making (e.g. by participating in consultations organised by local government, policymakers, NGOs⁶; signing a petition using a digital platform)
- Encourages everyone to collaborate through digital technologies and inclined to offer support to those whose level of digital skills and literacy makes collaborating in this way problematic.
- Encourages everyone to express their own opinions constructively when collaborating in digital environments.

6. a non-profit organisation that operates independently of any government, typically one whose purpose is to address a social or political issue.




1.5 Netiquette

To be aware of behavioural norms and know-how whilst using digital technologies and interacting within digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> differentiate simple behavioural norms and know-how while using digital technologies and interacting in digital environment choose simple communication modes and strategies adapted to an audience differentiate simple cultural and generational diversity aspects to consider in digital environments
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> clarify well-defined and routine behavioural norms and know-how while using digital technologies and interacting in digital environments express well-defined and routine communication strategies adapted to an audience describe well-defined and routine cultural and generational diversity aspects to consider in digital environments
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> discuss behavioural norms and know-how while using digital technologies and interacting in digital environments discuss communication strategies adapted to an audience discuss cultural and generational diversity aspects to consider in digital environments
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> guide others apply different behavioural norms and know-how while using digital technologies and interacting in digital environments adapt the most appropriate behavioural norms and know-how while using digital technologies and interacting in digital environments adapt the most appropriate communication strategies in digital environments to an audience apply different cultural and generational diversity aspects in digital environments
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> create solutions to solve complex problems with many interacting factors that are related to digital etiquettes respectful to different audiences and cultural and generational diversity integrate my knowledge to contribute to professional practice and knowledge and guide others in digital etiquette propose new ideas and processes to the field

1.6 Netiquette (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Aware of the meaning of non-verbal messages (e.g. smiley faces, emojis) used in digital environments (e.g. instant messaging) and knowing when it is appropriate to use them and that their use can culturally differ between communities.• Aware of the existence of some expected rules about their behaviour when using digital technologies (e.g. using audio headsets instead of loudspeakers when taking calls in public places).• Understands that inappropriate behaviours in digital environments can damage work reputation and personal aspects of their life.• Aware that adapting their behaviour in digital environments depends on their relationship with other participants (e.g. co-workers, managers or friends) and the purpose in which the communication takes place (e.g. to instruct, inform, persuade, order, inquire, socialise).• Aware of accessibility requirements when communicating in digital environments so that communication is inclusive and accessible for all users (e.g. for people with disabilities, older people, those with low literacy, speakers of another language).
 <p>Skills</p>	<ul style="list-style-type: none">• Can communicate appropriately for different work situations within the expected rules.• Able to stop receiving unwanted messages or emails.• Able to manage their feelings when talking with other people on digital platforms.• Able to recognise hostile or derogatory messages or activities online that attack certain individuals or groups of individuals (e.g. hate speech).• Can manage interactions and conversations in different social-cultural contexts and domain-specific situations.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Believes that it is necessary to define clear rules when communicating digitally for work purposes (e.g. codes of conduct for creating, sharing or posting content).• Inclined to adopt an empathic perspective in communication (e.g. being responsive to another person's emotions and experiences, negotiating disagreements to build and sustain fair and respectful relationships).• Open to and respectful of the views of people with different cultural affiliations, backgrounds, beliefs, values, opinions or personal circumstances; open to the perspectives of others even if they differ from their own.

1.6 Managing Digital Identity

To create, and manage one or multiple digital identities, to be able to protect themselves and their company's reputation, to deal with the data produced through digital tools, environments and services.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify a digital identity · describe simple ways to protect my reputation online · recognise simple data I produce through digital tools, environments or services
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · discriminate a range of well-defined and routine digital identities · explain well-defined and routine ways to protect my reputation online · describe well-defined data I routinely produce through digital tools, environments or services
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · display a variety of specific digital identities · discuss specific ways to protect my reputation online · manipulate data I produce through digital tools, environments or services
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · use multiple digital identities · apply different ways to protect my reputation online · explain the more appropriate ways to protect online reputations · change the data produced through several tools, environments and services
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors that are related to managing digital identities and protection of people's online reputation · integrate my knowledge to contribute to professional practice and knowledge and guide others in managing digital identity · propose new ideas and processes to the field

1.7 Managing Digital Identity (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Aware that digital identity refers to (1) the method of authenticating a user on a website, online service, and also to (2) a set of data identifying a user by means of tracing their digital activities, actions and contributions on the internet or digital devices (e.g. pages viewed, purchase history), personal data (e.g. name, username, profile data such as age, gender, hobbies) and context data (e.g. geographical location).
- Aware that AI systems collect and process multiple types of user data (e.g. personal data, behavioural data and contextual data) to create user profiles which are then used, for example, to predict what the user might want to see or do next (e.g. offer advertisements, recommendations, services).
- Understands how other organisations store and use their personal information and data.
- Knows that they have the right to ask a website's or search engine's administrators to access personal data held about you (right of access), to update or correct them (right of rectification), or remove them (right of erasure, also known as the Right To Be Forgotten).
- Aware that there are ways to limit and manage the tracking of their activities on the internet, such as software features (e.g. private browsing, deletion of cookies) and privacy-enhancing tools and product/service features (e.g. custom consent for cookies, opting out of personalised ads).



Skills

- Can create and manage profiles in digital environments for personal purposes (e.g. e-commerce and social media use) and professional purposes (e.g. create a profile on an online learning platform).
- Able to adopt information and communication practices in order to build a positive online identity (e.g. by adopting healthy, safe and ethical behaviours, such as avoiding stereotypes and consumerism).
- Able to conduct an individual or family name search in order to inspect their digital footprint in online environments (e.g. to detect any potentially troubling posts or images, to exercise their legal rights).
- Able to verify and modify what type of metadata (e.g. location, time) is included in pictures being shared in order to protect privacy.
- Can control, manage or delete data that is collected/curated by online systems (e.g. keeping track of services used, listing online accounts, deleting accounts that are not in use).
- Able to modify user configurations (e.g. in apps, software, digital platforms) to enable, prevent or moderate the AI system tracking, collecting or analysing data (e.g. not allowing the mobile phone to track the user's location).



Behaviours

- Careful about keeping their personal information private (e.g. holiday or birthday photos; religious or political comments).
- Considers the benefits (e.g. fast authentication process, user preferences) and risks (e.g. having identities stolen, personal data exploited by third parties) when managing one or multiple digital identities across digital systems, apps and services.
- Considers the benefits of Biometric access technology and profiles and how they can be used on a construction site to ensure that the identity of all those working can be verified.
- Inclined to check and select website cookies to be installed (e.g. accepting only technical cookies) when the website provides users with this option.
- Identifies both the positive and negative implications of the use of all data by AI systems (collection, encoding and processing).

1.7 Identifying digital competence gaps

To understand where their digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up to date with the digital evolution.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · recognise where my own digital competence needs to be improved or updated · identify where to seek opportunities for Continuing Professional Development (CPD) and to keep up to date with the digital evolution
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · explain where my digital competence needs to be improved or updated · indicate where to seek well-defined opportunities for Continuing Professional Development (CPD) and to keep up to date with the digital evolution
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · discuss where my digital competence needs to be improved or updated · indicate how to support others to develop their digital competence · indicate where to seek opportunities for Continuing Professional Development (CPD) and to keep up to date with the digital evolution
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · demonstrate where my own digital competence needs to be improved or updated · illustrate different ways to support others in the development of their digital competence · assess the development of both mine and others' digital competence · choose the most appropriate opportunities for Continuing Professional Development (CPD) and to keep up to date with new developments
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors that are related to improving digital competence, and to find opportunities for Continuing Professional Development (CPD) and to keep up to date with the digital evolution · integrate my knowledge to contribute to professional practice and to guide others in identifying digital competence gaps · propose new ideas and processes to the field

1.8 Identifying digital competence gaps (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Aware that being digitally competent requires the confident, critical and responsible use of digital technologies to achieve goals related to work and learning.
- Aware that difficulties experienced while interacting with digital technologies may be due to technical issues, lack of confidence, their competence gap or inadequate choice of digital tool to solve the problem in question.
- Aware that digital tools can be used to help identify their learning interests and setting personal and career goals (e.g. learning pathways).
- Knows that online learning can offer opportunities (e.g. video-tutorials, webinars, blended-learning-courses) to keep up to date with developments in digital technologies and to develop new digital skills.
- Knows that many sites are incorporating online site inductions and the use of onboarding software and knows how to access these.
- Knows where to gain help from within the organisation to assist with plugging their digital competence gaps.
- Knows that finding Continuing Professional Development (CPD) opportunities to improve their digital competence is important to future proofing themselves.



Skills

- Can get reliable feedback on digital competence through self-assessment tools, digital skills testing and certification.
- Capable of reflecting on their level of competence and make plans and take action to upskill (e.g. by undertaking training courses on digital competence).
- Can access online learning systems and/or knows who to speak to in order to gain help in doing so.
- Can keep a digital record of Continuing Professional Development (CPD) for future reference and update it as required.



Behaviours

- Has a disposition to keep learning, to educate themselves and stay informed through online learning programmes.
- Open to seeking help to be taught how to use an application (e.g. from a colleague or designated person) rather than delegating the task to someone else.
- Willing to help others to improve their digital competencies, building on their strengths and mitigating their weaknesses.
- Does not get discouraged by the fast pace of technological changes but believes that they can always learn more about how technology can be used for benefit in the workplace.
- Readiness to value their potential, as well as others' potential, to continuously learn using digital technologies as a lifelong process that requires openness, curiosity and determination.

2. Safety & Security

2.1 Protecting devices

To protect devices and digital content, and to understand the risks and threats in digital environments. To know about safety and security measures and to have a due regard to reliability and privacy.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify simple ways to protect devices and digital content · differentiate simple risks and threats in digital environments · follow simple safety and security measures · identify simple ways to take proper care or concern for reliability and privacy
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · indicate well-defined and routine ways to protect devices and digital content · differentiate well-defined and routine risks and threats in digital environments · select well-defined and routine safety and security measures · indicate well-defined and routine ways to take proper care or concern for reliability and privacy
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · organise ways to protect devices and digital content · differentiate risks and threats in digital environments · select appropriate safety and security measures · explain ways to take proper care or concern for reliability and privacy
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · choose the most appropriate protection for devices and digital content and apply it · differentiate risks and threats in digital environments · choose and apply the most appropriate safety and security measures · assess the most appropriate ways to take proper care or concern for reliability and privacy
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors that are related to protecting devices and digital content, managing risks and threats, applying safety and security measures, and reliability and privacy in digital environments · contribute to professional practice and knowledge and guide others in protecting devices · propose new ideas and processes to the field

2.1 Protecting devices (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Knows that using different strong passwords for different online services is a way to mitigate the negative effects of an account being compromised.
- Knows about measures to protect devices (e.g. password, biometrics, encryption) and prevent others from having access to data.
- Knows about the importance of keeping the operating system and applications up to date, in order to fix security vulnerabilities and protect against malicious software (i.e. malware).
- Knows that a firewall blocks certain kinds of network traffic, aiming to prevent different security risks (e.g. remote logins).
- Aware of different types of risks in digital environments, such as identity theft (e.g. someone committing fraud or other crimes using another person's personal data), scams (e.g. financial scams where victims are tricked into sending money) and malware attacks (e.g. ransomware).
- Knows how to follow procedure to report suspicious emails to organisational IT support staff.
- Knows their organisational IT and social media policies and who to contact with any questions or concerns.
- Knows which apps are allowed to be installed on company devices in line with company policies.
- Has knowledge of digital certifications and the standards required to meet them.



Skills

- Able to adopt a proper strategy regarding passwords (e.g. selecting strong ones that are difficult to guess) and managing them securely (e.g. using a password manager).
- Able to follow organisational guidelines and policies for choosing login information, including secure passwords, changing them when prompted.
- Can install and activate protection software and services (e.g. antivirus, anti-malware, firewall) to keep digital content and data safer.
- Can activate two-factor authentication when available (e.g. using one-time passwords (OTP), or codes along with access credentials).
- Can check the type of data an app accesses on a mobile device and, based on that, decide whether to install it and configure the appropriate settings.
- Able to encrypt sensitive data stored on a device or in a cloud storage service.
- Can respond appropriately to a security breach (i.e. an incident that results in unauthorised access to digital data, applications, networks or devices, the leaking of personal data such as logins or passwords) in line with organisational procedures.
- Can follow organisational procedures to backup content from work devices.



Behaviours

- Vigilant not to leave computers or mobile devices unattended in public places (e.g. shared workplaces, restaurants, trains) to ensure the security of intellectual property and designs.
- Weighs the benefits and risks of using biometric identification techniques (e.g. fingerprint, face images) as they can affect safety in unintended ways (e.g. if information is leaked or hacked, it becomes compromised and can lead to identity fraud).
- Keen to consider some self-protective behaviours such as not using open Wi-fi networks to make financial transactions.

2.2 Protecting data and privacy

To protect both personal and company data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect themselves and others from damages. To understand that digital services use a Privacy Policy to inform how personal data is used.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · select simple ways to protect data and privacy in digital environments · identify simple ways to use and share personally identifiable information while protecting myself and others from damages · identify simple privacy policy statements of how data is used in digital services
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · explain well-defined and routine ways to protect data and privacy in digital environments · explain well-defined and routine ways to use and share personally identifiable information whilst protecting myself and others from damages · indicate well-defined and routine privacy policy statements of how data is used in digital services
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · discuss ways to protect data and privacy in digital environments · discuss ways to use and share personally identifiable information while protecting myself and others from damages · indicate privacy policy statements of how data is used in digital services
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · choose the most appropriate ways to protect data and privacy in digital environments and apply them · evaluate the most appropriate ways of using and sharing personally identifiable information while protecting myself and others from damages · evaluate the appropriateness of privacy policy statements on how data is used and explain them
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors that are related to protecting data and privacy in digital environments, using and sharing personally identifiable information protecting self and others from dangers, and privacy policies to use data · integrate my knowledge to contribute to professional practice and knowledge and guide others in protecting data and privacy · propose new ideas and processes to the field

2.2 Protecting data and privacy (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Knows how to identify secure websites by looking for the padlock symbol and https:// in the address (URL) bar.
- Knows how to set privacy settings on social media and other accounts.
- Aware that secure electronic identification is a key feature designed to enable safer sharing of data with third parties when conducting public and private transactions.
- Knows that the “privacy policy” of an app or service should explain what data it collects (e.g. name, brand of device, geolocation of the user), and whether data is shared with third parties.
- Knows that the processing of data is subject to local regulations such as the General Data Protection Regulation (GDPR)
- Understands the threats and risks associated with carrying out activities online and the importance of working securely.
- Understands the regulatory and ethical importance of data privacy.



Skills

- Can identify suspicious e-mail messages that try to obtain sensitive information (e.g. personal data) or might contain malware. Knows that these emails are often designed to trick people who do not check carefully and who are thus more susceptible to fraud, by containing deliberate errors that prevent vigilant people clicking on them.
- Can respond to requests for authentication for my online accounts and email.
- Able to apply basic security measures when making online payments (e.g. never sending a scan of credit cards or giving the pin code of a debit/ payment/credit card).
- Can use electronic identification for services provided by public authorities or public services (e.g. filling-in your tax form, requesting certificates) and by the business sector, such as banks and transport services.
- Able to use digital certificates acquired from certifying authorities (e.g. digital certificates for authentication and digital signing stored on national identity cards).
- Demonstrates an awareness of security, systems and legacy management when performing activities that involve data and digital technologies.
- Can make ethical data decisions



Behaviours

- Weighs the benefits and risks before allowing third parties to process data (e.g. recognises that a voice assistant on a smartphone could give third parties - companies, cybercriminals - access to the data).
- Confident in carrying out online transactions after taking appropriate safety and security measures.

2.3 Protecting health, wellbeing and the environment

To be able to avoid health risks and threats to physical wellbeing while using digital technologies. To be able to protect themselves and others from possible dangers in digital environments. To be aware of digital technologies for social wellbeing and social inclusion. To be aware of the environmental impact of digital technologies and their use.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify simple ways to avoid health risks and threats to physical and psychological well-being while using digital technologies · select simple ways to protect myself from possible dangers in digital environments · identify simple digital technologies for social well-being and social inclusion · recognise simple environmental impacts of digital technologies and their use
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · explain well-defined and routine ways to how to avoid health risks and threats to physical and psychological well-being while using digital technologies · select well-defined and routine ways to protect myself from dangers in digital environments · indicate well-defined and routine digital technologies for social well-being and social inclusion · indicate well-defined and routine environmental impacts of digital technologies and their use
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · explain ways to how to avoid threats to my physical and psychological health related with the use of technology · select ways to protect self and others from dangers in digital environments · discuss on digital technologies for social well-being and inclusion · discuss ways to protect the environment from the impact of digital technologies and their use
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · examine the most appropriate ways to avoid health risks and threats to physical, psychological and environmental well-being while using digital technologies · adapt and apply the most appropriate ways to protect myself, others and the environment from dangers in digital technology · vary the use of digital technologies for social well-being and social inclusion
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors that are related to avoiding health risks and threats to physical, psychological and environmental well-being while using digital technologies · integrate my knowledge to contribute to professional practice and knowledge and guide others in protecting health, wellbeing and the environment · propose new ideas and processes to the field

2.3 Protecting health, wellbeing and the environment (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows that there are mental health and wellbeing apps available for construction workers and how to access them.• Knows that their safety and that of others can be compromised through digital distractions (e.g. using a personal device whilst working at height)• Aware of the importance of balancing the use of digital technologies with non-use as an option, as many different factors in digital life can impact on personal health and wellbeing.• Understands that cyberbullying is bullying with the use of digital technologies (i.e. a repeated behaviour aimed at scaring, angering or shaming those who are targeted).• Knows that using digital technologies should lead to improved productivity and lead to the reduction in 'wasted time' and frustration.• Know the procedures for reporting digital technology related hazards, risks or accidents at work• Aware of the environmental impact of everyday digital practices (e.g. video streaming that rely on data transfer), and that the impact is composed of energy use and carbon emissions from devices, network infrastructure and data centres.• Aware of the environmental impact of the manufacturing of digital devices and batteries (e.g. pollution and toxic by-products, consumption of energy) and that at the end of their life, such devices must be appropriately disposed of to minimise their environmental impact and to enable reuse of rare and expensive components and natural resources.• Aware that some components of electronic and digital devices can be replaced to extend their life or performance, however, some might be purposefully designed to stop functioning correctly after a certain period (planned obsolescence).• Knows that e-commerce practices such as purchasing and delivery of physical goods have an impact on the environment (e.g. carbon footprint of transport, generation of waste).
 <p>Skills</p>	<ul style="list-style-type: none">• Can apply a variety of digital usage monitoring strategies where required.• Takes breaks from using digital technologies to avoid fatigue and prevent errors.• Can respond appropriately to reduce potential risks in own working environment and work practice.• Can apply simple methods to avoid physical and psychological health risks while using digital devices.• Can apply efficient low-tech strategies for protecting the environment, e.g. shutting down devices and switching off Wi-fi, not printing out documents, repairing and replacing components to avoid the unnecessary replacement of digital devices.• Can reduce the energy consumption of devices and services used, (e.g. change the quality settings of video streaming services, using Wi-fi rather than data connectivity when working, closing apps, optimising email attachments).• Able to use digital tools to improve the environmental impact of their consumer behaviour (e.g. by looking for local suppliers, by searching for collective deals and car-sharing options for work journeys).
 <p>Behaviours</p>	<ul style="list-style-type: none">• Inclined to focus physical and mental wellbeing and avoid the negative impacts of digital media (e.g. overuse, addiction, compulsive behaviour).• Wary of the reliability of recommendations (e.g. are they by a reputable source) and their intentions.• Seeks out ways in which digital technologies could help work in a way which respects the sustainability of the natural environment (e.g. using Genny & CAT equipment to locate underground services first before digging risk holes).• Considers product's overall impact on the environment when choosing digital means over physical products, (e.g. reading a document online does not need paper and thus transport costs are low).




2.4 Security and Ethics ^{DT}

To be aware of the ethical and legal standards when using data and to understand the purpose of the data that you are working with.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · adhere to ethical and legal standards and protocols when using data · demonstrate an awareness of security, systems and legacy management when performing activities that involve data and technology · understand the purpose of business impact analysis, crisis management, continuity and recovery plans in relation to IT policy and regulatory requirements · understand the regulatory and ethical importance of data privacy
Competent Users	On my own and solving straightforward problems, I:	<ul style="list-style-type: none"> · understand the reasoning behind different ethical and legal standards and protocols that surround data, including its quality and use (including sharing) · practice secure methods when collecting and analysing data whilst showing working knowledge of the different security and legacy requirements of different systems
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · perform business impact analysis and technology risk assessments in relation to IT policy and regulatory requirements · practice good understanding of data privacy by gaining consent to use personal data and/or anonymising data when individuals could be identified
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · author internal organisational ethical governance standards and protocols. · act as the first point of escalation for non-compliance · articulate security and ethical design requirements and recommend measures to ensure systems stay secure · analyse risk and perform steps to manage crisis issues and develop and implement continuity and recovery plans · justify the use of personal or sensitive data when challenged on business ethical and legal grounds
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · define best practice for standards and protocols and sets tasks and targets in relation to legal compliance, governance procedures and business integrity · actively drives a secure design approach by choosing, using and designing technology · raise awareness for cyber security risks and the role and methods systems can play to prevent them being realised and act as the final point of escalation for non-compliance · promote continuous assessment of cyber security risk and resilience by ensuring penetration testing is performed to ensure business continuity and legal obligations are met. · stay up to date with hacking methods to recommend technology and processes to prevent attacks · be an advocate 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 · propose new ideas and processes to the field

2.4 Security and Ethics (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows how to follow ethical and legal standards and protocols when using data.• Understands the regulatory and ethical importance of data privacy.• definitions of data terms, types and sources• knowledge of methods and tools with the ability to present new data collection and storage methods coherently.• Calculates and advises on risk/reward ratio of investment in data analysis and sharing.• Understands the reasoning behind different ethical and legal standards and protocols that surround data, including its quality and use.
 <p>Skills</p>	<ul style="list-style-type: none">• Demonstrates an awareness of security, systems and legacy management when performing activities.• Able to analyse risk and perform steps to manage crisis issues and develop and implement continuity and recovery plans.• Can perform business impact analysis and technology risk assessments.• Can act as a governing and compliance authority to inform how data is used.• Applies specialist and detailed technical expertise to analyse organisational data.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Embodies a secure by design approach to cyber security and business continuity.• Considers data decisions in context of business integrity and ethics whilst ensuring data privacy and legal obligations are adhered to.• Actively drives a secure by design approach to choosing, using and designing technology.• Encouraging a culture of reporting security breaches, ethical violations, or misconduct by promptly reporting concerns to appropriate authorities or whistleblowing mechanisms, without fear of retaliation.• Staying informed about emerging security threats, ethical issues, and best practices through ongoing education, training, and professional development opportunities to enhance knowledge and skills.• Champions innovation across the organisation.

3. Design & Development




3.1 Identifying needs and technological responses

To assess needs. To identify, evaluate, select and use digital tools. Provide possible technological responses and to solve them.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify needs and recognise simple digital tools and possible technological responses to solve those needs · choose simple ways to adjust and customise digital environments to meet personal and work needs
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · indicate well-defined and routine needs and select well-define and routine digital tools and possible technological responses to solve those needs · select well-defined and routine ways to adjust and customise digital environments to meet personal and work needs
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · explain needs and select digital tools and possible technological responses to solve those needs · select ways to adjust and customise digital environments to meet personal and work needs
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · assess needs and choose the most appropriate digital tools and possible technological responses to solve those needs · apply different digital tools and possible technological responses to solve needs · decide the most appropriate ways to adjust and customise digital environments to meet personal and work needs
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors using digital tools and possible technological responses, and to adapt and customise digital environments to meet personal and work needs · integrate my knowledge to contribute to professional practice and knowledge and guide others in identifying needs and technological responses · propose new ideas and processes to the field

3.1 Identifying needs and technological responses (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows that there is a wealth of available apps to help complete daily tasks both at work and for personal use.• Knows that it is possible to buy and sell goods and services on the internet through commercial transactions (e.g. e-commerce) and consumer-to-consumer transactions (e.g. sharing platforms).• Knows that different rules (e.g. legal consumer protections) apply when buying online from a company than from a private person.• Able to identify some examples of AI systems: product recommenders (e.g. on online shopping sites), voice recognition (e.g. by virtual assistants), image recognition (e.g. for detecting unground services) and facial recognition (e.g. in surveillance systems or biometric systems).• Aware that many non-digital artefacts can be created using a 3D printer (e.g. to print spare parts for domestic appliances or furniture).• Knows technical approaches that can improve the inclusiveness and accessibility of digital content and services, e.g. tools such as magnification or zoom and text-to-voice functionality.• Aware that AI-driven speech-based technology enables the use of spoken commands that can enhance the accessibility of digital tools and devices (e.g. for those with mobility or visual limitations, limited cognition, language or learning difficulties), however, languages spoken by smaller populations are often not available, or perform worse, due to commercial prioritisation.
 <p>Skills</p>	<ul style="list-style-type: none">• Able to identify construction specific apps which support with daily tasks (e.g. Building Calculator).• Able to use the internet to conduct transactions (e.g. purchasing, selling) and non-commercial transactions (e.g. donating, gifting) of goods and services of all kinds.• Able to use machine translation solutions (e.g. Google Translate) and simultaneous interpretation apps (e.g. iTranslate) to get a rough understanding of a document or conversation. However, also knows that when the content requires an accurate translation (e.g. in a work situation for commerce or diplomacy), a more precise translation may be needed.• Can choose assistive tools to better access information and content online (e.g. screen readers, voice recognition tools), and to take advantage of voice output options to produce speech (e.g. to be used by individuals who have limited or no means to communicate orally).
 <p>Behaviours</p>	<ul style="list-style-type: none">• Values the benefits of managing finances and financial transactions through digital means while acknowledging the associated risks.• Open to explore and spot opportunities created by digital technologies for their personal needs (e.g. seeking hearing aids that pair with their most-used devices, such as smartphone).• Open to explore opportunities created by digital technologies for work needs (e.g. incorporating facial recognition software or biometric access technology to keep an accurate record of who is on site).• Critically aware that exclusive reliance on digital technologies can pose risks.




3.2 Solving digital technology problems and programming

To identify technical problems when operating devices and using digital environments, and to plan and develop a sequence of understandable instructions to solve a given problem or to perform a specific task.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify and record simple digital technology problems when operating devices and using digital environments · identify simple solutions to solve them · escalate problems in line with organisational procedures · list simple instructions for a computing system to solve a simple problem or perform a simple task
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · indicate well-defined and routine digital technology problems when operating devices and using digital environments · select well-defined and routine solutions to solve them · escalate problems in line with organisational procedures · list well-defined and routine instructions for a computing system to solve routine problems or perform routine tasks
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · differentiate problems when operating devices and using digital environments · troubleshoot slow running devices through checking processes · select appropriate solutions to solve them in line with organisational procedures · list instructions for a computing system to solve a given problem or perform a specific task
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · appraise problems when operating devices and using digital environments · resolve problems with the most appropriate solutions applying different solutions as required · run performance checks on devices in case of poor performance or charging · operate with instructions for a computing system to solve a different problem or perform different tasks · determine the most appropriate instructions for a computing system to solve a given problem and perform specific tasks · create solutions to complex problems with limited definition that are related to planning and developing instructions for a computing system and performing a task using a computing system.
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors that are related to digital technology problems and planning and developing instructions for a computing system · integrate my knowledge to contribute to professional practice and knowledge and to guide others in solving problems and programming · propose new ideas and processes to the field

3.2 Solving digital technology problems (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows the main functions of the most common digital devices (e.g. computer, tablet, smartphone).• Understands how to carry out basic fault finding using digital tools to solve basic problems.• Knows reasons why a digital device may fail to connect online (e.g. wrong Wi-fi password, airplane mode on).• Knows that computing power or storage capacity can be improved to overcome fast obsolescence of hardware (e.g. by contracting power or storage as a service).• Aware that the most frequent sources of problems in Internet of Things (IoT) and mobile devices, and in their applications, are related to connectivity/network availability, battery/power, limited processing power.• Knows where to source help to assist with resolution of routine problems.• Knows the organisational escalation procedures to follow for digital technology issues.• Knows that computer programs are made up of a set of instructions, written in accordance with the rules in a programming language.• Knows that programming languages provide structures that allow program instructions to be executed in sequence, repeatedly, or only under certain conditions, and to group them to define new instructions.• Knows that programs are executed by computing devices/systems, that are able to automatically interpret and execute instructions.• Knows that, to produce its output, a program stores and manipulates data in the computer system that executes it, and that it sometimes behaves unexpectedly (e.g. faulty behaviour, malfunction, data leakage).• Knows that a program's blueprint is based on an algorithm, i.e. a method to produce an output from an input.
 <p>Skills</p>	<ul style="list-style-type: none">• Can use digital tools and techniques to research, collaborate and resolve problems.• Takes a step-by-step approach to identify the route of a problem (e.g. hardware vs software).• Can explore various solutions when facing a technical malfunction.• Able to find information and potential solutions on the internet when facing a digital technology problem.• Can identify error codes produced by faulty digital technology systems.• Can look up error codes to identify problems and resolutions.• Can check the performance of mobile device batteries including laptops, tablets and mobile phones.• Able to list instructions that can be used for a computing system to solve a problem.• Able to combine a set of program blocks (e.g. as in the visual programming tool Scratch), in order to solve a problem.• Able to detect issues in a sequence of instructions and make changes to resolve them (e.g. to find an error in the program and correct it; to detect the reason why the execution time or output of the program is not as expected).
 <p>Behaviours</p>	<ul style="list-style-type: none">• Takes an active and driven approach to explore how digital technologies operate.• Understands that different digital tools can improve the organisations productivity and open to exploring new ideas.• Actively engages in problem solving activities at work in order to improve their knowledge and ability.• Inclined to perform basic checks of common problems before escalating digital technology problems.• Willing to accept that algorithms, and hence programs, may not be perfect in solving the problem that they aim to address.• Considers ethics (including but not limited to human agency and oversight, transparency, non-discrimination, accessibility, and biases and fairness) as one of the core pillars when developing or deploying AI systems.• Appreciating the benefits of using algorithms in daily life.




3.3 Developing, integrating and re-elaborating digital content

To create and edit digital content in different formats, to express the proposed content through digital means. To modify, refine and integrate new information and content into an existing body of knowledge and resources to create new, original and relevant content and knowledge.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify ways to create and edit simple content in simple formats · choose how to express the proposed content through the creation of simple digital means · select ways to modify, refine, improve and integrate simple items of new content and information to create new and original data
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · indicate ways to create and edit well-defined and routine content in well-defined and routine formats · express the proposed content through the creation of well-defined and routine digital means · explain ways to modify, refine, improve and integrate well-defined items of new content and information to create new and original data
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · indicate ways to create and edit content in different formats · express the proposed content through the creation of digital means · discuss ways to modify, refine, improve and integrate new content and information to create new and original data
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · apply ways to create and edit content in different formats · show ways to express the proposed content through the creation of digital means · change content using the most appropriate formats · adapt the expression of the proposed content through the creation of the most appropriate digital means · operate with new different items of content and information, modifying, refining, improving and integrating them in order to create new and original data · assess the most appropriate ways to modify, refine, improve and integrate specific new items of content and information to create new and original data
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors that are related to content creation and edition in different formats, and expression through digital means · create solutions to solve complex problems with many interacting factors that are related to modifying, refining, improving and integrating new content and information into existing knowledge to create new and original data · integrate my knowledge to contribute to professional practice and knowledge and guide others in developing, integrating and re-elaborating content · propose new ideas and processes to the field

3.3 Developing digital content (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows that digital content exists in a digital form and that there are many different types of digital content (e.g. audio, image, text, video, applications) that are stored in various digital file formats.• Knows that AI systems can be used to automatically create digital content (e.g. texts, news, essays, tweets, music, images) using existing digital content as its source. Such content may be difficult to distinguish from human creations.• Aware that “digital accessibility” means ensuring that everyone, including people with disabilities, can use and navigate the internet. Digital accessibility includes accessible websites, digital files and documents, and other web-based applications (e.g. for accessing public services, and messaging and video-calling services).• Aware that virtual reality (VR) and augmented reality (AR) allow new ways to explore simulated environments and interactions within the digital and physical worlds.• Aware that it is possible to integrate hardware (e.g. sensors, cables, motors) and software structures to develop programmable robots and other non-digital artefacts (e.g. Micro: bit, Raspberry Pi, EV3, Arduino, ROS).• Aware that applications can be adapted and edited to meet the specific needs of those using the data captured by them.• Aware of the policies and procedures for managing data assets, including data standards, security measures, and compliance requirements.• Aware of various integration techniques such as ETL (Extract, Transform, Load), data virtualization, data replication, and API integration to consolidate data from disparate sources.
 <p>Skills</p>	<ul style="list-style-type: none">• Can use tools and techniques to create accessible digital content (e.g. add text to images, tables and graphs; create a proper and well-labelled document structure; use accessible fonts, colours, links) following organisational standards and guidelines.• Can select the appropriate format for digital content according to its purpose (e.g. saving a document in an editable format vs a document that cannot be modified but is easily printed).• Can create digital content to support suggested ideas (e.g. to produce data representations such as interactive visualisations using basic datasets).• Can create digital content on open platforms (e.g. create and modify text in a wiki environment).• Can use tools and applications (e.g. add-ons, plug-ins, extensions) to enhance digital accessibility of digital content (e.g. adding captions in video players to a recorded presentation).• Able to integrate digital technologies, hardware and sensor data to create a new (digital or non-digital) artefact (e.g. makerspace and digital fabrication activities).• Can incorporate AI edited/manipulated digital content in their work.• Can create infographics and posters combining information, statistical content and visuals using available apps or software.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Inclined to combine various types of digital content and data to better express facts or opinions for professional use.• Open to explore alternative pathways to find solutions to produce digital content.• Open to using virtual reality headsets (VR Headsets) to explore simulated environments and interactions within the digital and physical worlds.• Open to creating something new from existing digital content using iterative design processes (e.g. create, test, analyse and refine ideas).• Inclined to help others to improve their digital content (e.g. through providing useful feedback).

3.4 Copyright and licences

To understand how copyright and licences apply to digital information and content.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify simple rules of copyright and licences that apply to data, digital information and content
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · indicate well-defined and routine rules of copyright and licences that apply to data, digital information and content
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · discuss rules of copyright and licences that apply to digital information and content
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · choose the most appropriate rules that apply copyright and licences to data, digital information and content and apply them
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors that are related to applying copyright and licences to data, digital information and content · integrate my knowledge to contribute to professional practice and knowledge and guide others in applying copyright and licences · propose new ideas and processes to the field

3.4 Copyright and licences (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Knows that digital content, goods and services might be protected under intellectual property (IP) rights (e.g. copyright, trademarks, designs, patents).
- Aware that the creation of digital content (e.g. pictures, texts, music) when original is considered protected by copyright as soon as it exists (automatic protection).
- Aware that certain copyright exceptions exist (e.g. use for the purpose of illustration for teaching, for caricature, parody, pastiche, for quotation, private uses).
- Knows different models of licensing software (e.g. proprietary, free and open-source software) and that some types of licences need to be renewed once the licence period expires.
- Aware of the legal limitations of using and sharing digital content (e.g. music, movies, books) and the possible consequences of illegal actions (e.g. sharing copyrighted content with others can give rise to legal sanctions).
- Aware that mechanisms and methods to block or limit access to digital content exist (e.g. passwords, geo-blocking, Technical Protection Measures, TPM).



Skills

- Able to identify and select digital content for downloading or uploading legally (e.g. public domain databases and tools, open licences).
- Able to use and share digital content legally (e.g. checks the terms and conditions and licensing schemes available, such as the various types of Creative Commons) and knows how to assess whether limitations and copyright exceptions apply.
- Able to identify when uses of copyright-protected digital content fall under the scope of a copyright exception so that no prior consent is needed.
- Able to check and understand the right to use and/or re-use digital content created by a third party (e.g. knows about collective licencing schemes and contacts the relevant collective management organisations, understands the various Creative Commons licences).
- Can choose the most suitable strategy, including the licensing, for the purpose of sharing and protecting their original creation (e.g. by registering it in an optional copyright deposit system; choosing open licences such as Creative Commons).



Behaviours

- Respectful of rights affecting others (e.g. ownership, contract terms), only using legal sources for downloading digital content (e.g. movies, music, books) and when relevant, opting for open-source software.
- Open to consider whether open licences or other licence schemes are more suitable when producing and publishing digital content and resources.
- Encourage a culture of respect for intellectual property rights and ethical use of copyrighted materials among colleagues

3.5 Creatively using digital technologies

To use digital tools and technologies to create knowledge and to innovate processes and products. To understand how copyright and licences apply to digital information and content.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify simple digital tools and technologies that can be used to create knowledge and to innovate processes and products · follow individually and collectively simple cognitive processing to understand and resolve simple conceptual problems and problem situations in digital environments
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · select digital tools and technologies that can be used to create well-defined knowledge and well-defined innovative processes and product · engage individually and collectively in some cognitive processing to understand and resolve well-defined and routine conceptual problems and problem situations in digital environment
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · differentiate digital tools and technologies that can be used to create knowledge and to innovate processes and products · engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · adapt the most appropriate digital tools and technologies to create knowledge and to innovate processes and products · resolve individually and collectively conceptual problems and problem situations in digital environments
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · create solutions to solve complex problems with many interacting factors using digital tools and technologies · integrate my knowledge to contribute to professional practice and knowledge and guide others in creatively using digital technologies · propose new ideas and processes to the field

3.5 Creatively using digital technologies (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows that engaging in solving problems collaboratively, online or off-screen, means that they can take advantage of the variety of knowledge, perspectives and experiences from others which can lead to better outcomes.• Knows that digital technologies and electronic devices can be used as a tool to support the innovation of new processes and products, in order to create social, cultural and/or economic value (e.g. social innovation). Aware that what creates economic value might endanger or enhance social or cultural value.• Knows that applications of Internet of Things (IoT) technology have the potential to be used in the construction sector.• Awareness of current and emerging trends in digital technologies relevant to their industry• Knowledge of data analysis techniques and data visualization tools to analyse and interpret data, identify patterns and trends
 <p>Skills</p>	<ul style="list-style-type: none">• Can use digital technologies to help turn ideas into action (e.g. up to date with available digital technologies that are suitable to support ideas).• Can identify online platforms that can be used to design, develop and test IoT technologies and mobile apps.• Able to plan a strategy using multiple IoT and mobile devices to implement a task (e.g. use a smartphone to optimise energy consumption in a room by setting the intensity of the lights based on the time of day and ambient light).• able to articulate clearly exactly what problem needs solving and the tools and equipment required.• Ability to think outside the box and generate novel ideas, designs, or strategies using digital mediums.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Motivated to co-design and co-create new products and services using digital devices (i.e. end-user development) to create economic or social value for others (e.g. in makerspaces and other collective spaces).• Open to engage in collaborative processes to co-design and co-create new products and services based on AI systems to support and enhance productivity on a construction site.• Willing to take part in challenges aimed at solving intellectual or practical problems through digital technologies (e.g. hackathons, ideations, grants, joint initiation of projects).• integrate various digital tools and applications to create synergies and streamline workflows, minimizing manual intervention and redundancy.• invest time in self-education and seek out resources to stay updated on the latest digital trends, tools, and techniques relevant to their field of work

4. Data capture, analysis and insight

4.1 Using data sets

To understand the difference between raw data and manipulated data. To know where data has come from and its intended purpose. To identify trends, analyse and draw conclusions from the data.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> • identify information needs • import data sets from files and spreadsheets • access and update data in a specific data set • create basic data sets • provide requested data sets to others
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> • identify problems with data sets • show an understanding of the levels of accuracy required when requesting or providing data sets • store data for reference or later use • provide basic reporting based on data sets
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> • identify and articulate any problems with the data set • remove duplicate, inaccurate and null data • identify trends in the data set • analyse the data set and draw conclusions from it • find out how to locate more accurate or more relevant data • ensure data storage accuracy and security • provide more complex reporting based on data sets
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> • guide others • compare data sets and draw conclusions • create solutions to complex problems using data sets • validate data to identify non-compliant data • make decisions based on multiple data sets • undertake data-driven storytelling to communicate data, trends, patterns and derived analytical insights • analyse the quality and accuracy of the data
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> • make strategic decisions based on multiple data sets • create solutions to solve complex problems with many interacting factors that are related to the data sets • build a scalable data analytics pipeline • integrate my knowledge to contribute to professional practice and knowledge and guide others in identifying needs and technological responses • propose new ideas and processes to the field

4.1 Using data sets (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Knows the main data types and formats used.
- Knows what the data lifecycle is.
- Understand that data accuracy can impact the quality and reliability of the decisions and reporting based on that data.
- Understands of the difference between raw data and manipulated data.
- Know what the purpose of the analysis study of the data set is.
- Know who the target users / audience for the data set is.
- Know what is meant by structured/unstructured data and numerical/categorical data.
- Know how to manage digital information responsibly and in line with organisational procedures.
- Know how to find the most appropriate data to display for a given support solutions.
- Knows different graph and chart methods used to summarise, analyse and interpret numerical data.
- Knows the steps involved in determining the trendline equation.
- Know how to define, capture and document key performance indicators (KPIs) in context.



Skills

- Can import data sets from files and other spreadsheets.
- Can use data tools available and how to apply them in context.
- Can create graphs and charts using spreadsheet functions.
- Can identify the data pattern displayed by the data.
- Can use data modelling to help in the visual representation of data.
- Can identify business problems to be addressed using data visualisation and detailed stages of a data lifecycle, including create, store, use, archive and destroy.
- Can respond to common data validation and trend analysis error messages.
- Can layout and save trend analysis graphs and charts.
- Can prepare datasets for data visualisation, the structure and the need to restructure, and reshape datasets to support different requirements.
- Can manage the reproducibility, security and source control of data sets.



Behaviours

- Considers the importance of data validation and verification and how these can be assured in spreadsheets.
- Promotes integration by aggregating data and making sharing data possible by moving towards automation to creates efficiencies.
- Considers transparency when manipulating and presenting data to ensure reliability, and spots data that are expressed with underlying motives.
- Willing to adapt an appropriate communication strategy depending on the situation and digital tool.
- Inclined to use available tools to verify whether data have been modified.




4.2 Capturing data using hardware

To know how to capture the required data using hardware and digital tools to gather accurate, real-time data to feed back to digital systems.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · prepare and setup a device for use · input data accurately into a device · follow guidelines and procedures for use of devices · organise and store data efficiently on a device · keep data secure when using a device
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · prepare, setup and configure a device for use · select use and customise interface features and settings to meet needs · select and use applications and files on a device effectively · organise, store and retrieve data efficiently on a device
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · prepare, setup and configure a device for use · use appropriate techniques to optimise the performance of the device · use appropriate fault-finding procedures to identify problems · organise, store and retrieve data efficiently on a device · use tools to prepare or convert files to an appropriate format for use with other devices
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · use tools to prepare or convert files to an appropriate format for use with other devices · use appropriate fault-finding procedures to identify and solve problems
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · use appropriate procedures to solve problems presented · transfer information to and from devices using secure connection procedures · integrate my knowledge to contribute to professional practice and knowledge and guide others in identifying needs and technological responses · propose new ideas and processes to the field

4.2 Capturing data using hardware (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows the different features of devices being used.• Knows the health and safety issues associated with the use of devices.• Has knowledge of the factors that can affect performance of the device.• Knows common problems associated with devices and what causes them.• Knows how to maintain media storage devices for efficient operation.• Understands the purpose of the data being captured to ensure efficiency.• Understands that it is possible to integrate hardware and software structures to create non-digital artefacts
 <p>Skills</p>	<ul style="list-style-type: none">• Can setup and calibrate the device.• Use the most appropriate file formats for the data being produced.• Can make setting adjustments to the device to make improvements.• Can seek advice with the use of devices and features.• Can use tools and techniques to exchange information between devices.• Can operate the hardware to capture accurate and viable data.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Inclined to keep information secure and to respect others when using devices.• Recognises copyright and other constraints on the use and transfer of data.• Inclined to use available tools to provide real world evidence over relying on simulations and virtual evidence.• Observant of the environment and its current conditions.

4.3 Data Fundamentals⁷

To know what good quality data looks like and can articulate the purpose and value of using it, whilst recognising how to generate value and making decisions with it.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · show an understanding of different data terms, types and sources · use established methods to collect, store and share data
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · show awareness of what good quality data looks like and how it informs decision making · demonstrate a strong understanding of the value of data · demonstrate the ability to manage different types of data according to its qualities
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · use knowledge of data to help others in the team to collect and store it efficiently · generate good quality data to support decision making · guide others in understanding of data terms, types and sources
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · recognise the benefits of data to inform how to collect and manage it, using both established and original methods · articulate the value of data to others in a way that is easy to comprehend · oversee the use of good quality data to support both my own and other's decisions, including the types and quality of data needed and questions being addressed · encourage others to see the value in data by promoting data sharing and an open data culture
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · challenge existing definitions of data terms, types and sources and write new definitions where applicable. · demonstrate knowledge of methods and tools with the ability to present new data collection and storage methods coherently · make critical decisions by understanding and synthesising high volume, high velocity or complex heterogeneous data and able to spot quality issues and recommend improvements · enable and coach others to make data-driven decisions · define new uses and value from data and can articulate the steps others need to take to generate increased value from data

7. DT = Digital Twins. This is a skill particularly associated with working with Digital Twins

4.3 Data Fundamentals (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Knows how to use established methods to collect, store and share data (e.g. having a single source of truth for a digital file).
- Understands how the lifecycle of data is heavily interwoven with the lifecycle of a process and how they are dependent on each other for benefits to be realised.
- Knows the potential barriers with data sharing in terms of protectionism, confidentiality, and security.
- Understands prescriptive analytics, Machine learning and Artificial intelligence, and the current limitations associated with these emerging areas.
- Understands how the data produced will be used and play a critical role in maintaining and improving the quality of an organisation's data.
- Understands ethical and legal standards and protocols when using data.



Skills

- Able to convey the value of data to others in a way that is easy to comprehend (e.g. not using technical jargon).
- Able to recognise the benefits of data to inform how to collect and manage it using both established and novel methods.
- Able to connect the lifecycle of data with the lifecycle of a process.
- Able to tailor the user experience and application to provide an intuitive and accessible design that meets demands.



Behaviours

- Open to having an open data culture to aid productivity and limit the amount of time wasted on site.
- Raises awareness for cyber security risks and the role and methods systems can play to prevent them being realised.
- A level of ownership outside of specified data roles and specialists for lifecycle assurance and quality management.
- Promoting a better adoption of technology.
- Prioritises security and ethics when sharing data.




4.4 Analytics and Intelligence ^{DT}

To know what good quality data looks like and its ability to be analysed. To draw insight from data in the form of visual communication that others are receptive to. To use statistical, practical and ethical methods to design and enhance algorithms.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · identify what good quality data looks like in relation to its ability to be analysed and inform decision making · use scientific methods to manipulate data when running analyses, including extrapolation and regression
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · define requirements of good quality data to support analysis · use statistical, physical and ethical methods to analyse data across different data sets
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · follow data modelling principles when transforming and analysing data and can do so with different data sets · draw insight from data in the form of visual communication that users are receptive to
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · actively engage others to build an understanding on the quality requirements of data being produced and analysed and how this can enable better decision making · use statistical, practical and ethical methods to design and enhance algorithms and has knowledge of how algorithms can be made scalable across various data sets · recognise the types of data needed to generate insights and support decision making, and decide 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
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · champion 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 · oversee the design of algorithms, evaluating and championing ethics and advising on how they can be resiliently scaled across large data sets · use 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 · advise on best practice visualisation methods to present new evidence as well as being able to evaluate the quality and value of that evidence

4.4 Analytics and Intelligence (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows different mathematical and statistical techniques for analysing data.• Knows different mediums used to convey information (e.g. reports, visualisations, dashboards).• Knowledge of database systems and data warehousing technologies.• Knows of the various security requirements, legislation and regulations in regard to implement data and information policies.• Aware of client tools used by business users.• Aware of data models.• Understanding of programming tools used in analytics.
 <p>Skills</p>	<ul style="list-style-type: none">• Can use statistical, practical and ethical methods to analyse data across different data sets.• Able to specify 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 techniques to improve data interpretation and aid decision making.• Able to manage database system integration, implementation and testing.• Able to manage relational databases and create complex reports.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Champions the use of good quality data and its impact on analytics and intelligence.• Takes an active and curiosity driven approach to explore how digital technologies operate.• Open to data results being used to supporting to make informed decisions in accordance with their goals.• Interested in experimenting with various types of data methods depending on their own personal needs.

5. Modelling & Simulation

5.1 Data modelling⁸




To understand how to build data that can be exposed and integrated with other external systems. To use reference data models to make organisable data models relevant to real world application. To recognise the concepts in relation to their broader impact on data sharing and interoperability.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> • define the purpose of ontologies¹ in relation to my organisation and the construction industry • show an awareness of different reference data models that exist within the organisation and how they relate to business processes • recognise the semantics and related taxonomies of the industry and can classify data • show insight into the flow of data, including how data travels between systems and how systems can share data with one another
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> • use own knowledge of standard ontologies in relation to my organisation and industry to influence how they distinguish data concepts and their relationships • use own knowledge of taxonomies to create data models that classify and organise data into hierarchal meaning
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> • build data products that can be exposed and integrated with other external systems, such as through Application Programmable Interfaces (APIs)
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> • guide others • write and maintain ontologies using logic and can represent how data concepts relate to each other • relate ontologies to complex taxonomies in order to classify and organise vast amounts of data • 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 • advise on design and data modelling to facilitate better data sharing and interoperability between systems
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> • advise on industry wide ontological development using logic, philosophy, collaboration and industry knowledge • advise on the principles of logic and philosophy that apply to taxonomies and uses automation to classify and organise data at scale • advise on industry wide reference data models based on industry knowledge of semantics to make data interoperability automated and coherent • challenge behaviours that go against data sharing and interoperability

8. Digital construction ontologies aim to capture the relevant objects and properties (relationships and attributes) that can be referred to by people or systems during the management and execution of construction or renovation projects.

5.1 Data modelling (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows how to use data modelling to help in the visual representation of data.• Knows how to reference data models to make organisable data models relevant to real world application.• Understands the flow of data, including how it travels between systems.• Understands how systems are able to share data with one another.• Understands how to improve local and metadata models.• Knows how to identify areas of risk or restriction.• Understands how to identify entities, their key properties and relationships, and map accordingly.• Knows that algorithms, and consequently programs, are designed to help solve real life problems.• Understands the semantics and related taxonomies of the industry and can classify data.
 <p>Skills</p>	<ul style="list-style-type: none">• Can use knowledge of reference data models to make organisable data models relevant to real world application.• Can take a systems-thinking and logical approach to plan, design manage and optimise the flow of data.• Can demonstrate a clear understanding of engineering semantics such as ontologies, associated taxonomies and reference data.• Can evaluate changes to existing systems for cross-compatibility.• Can use implemented data systems to assess and highlight variances, discrepancies and efficiency.• Can define the purpose of ontologies at a high level in relation to their organisation and industry.• Can build data products that can be exposed and integrated with other external systems, such as through Application Programmable Interfaces (APIs).
 <p>Behaviours</p>	<ul style="list-style-type: none">• Recognises these concepts in relation to their broader impact on data sharing and interoperability.• Champions organisations to take a data-led approach rather than a technology-led approach.• Inclined to challenge behaviours that go against data sharing and interoperability.• Be an advocate for an open data approach through architecture model design.• Takes a systems-thinking and logical approach to plan, design, manage and optimise the flow of data.• Challenges behaviours that go against data sharing and interoperability and advocates for an open data approach through architecture model design.




5.2 Capturing high quality images using digital technologies

To know how to take high-quality images using appropriate digital technologies. To be aware of the requirements and how the high-quality images will be used to inform other processes.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> take a high-quality image according to issued instructions using the appropriate digital technology store the image to a suitable storage device or area
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> capture high-quality images, according to issued instructions, using the appropriate digital technology adjust the digital technology settings to ensure the image is of sufficient quality for its intended purpose save the image using the appropriate naming convention and to an assigned storage device or area
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> adjust the digital technology settings to ensure the image is of sufficient quality for its intended purpose capture the specified high-quality images ensuring sufficient points of interest have been captured store and share the images taken as required convert digital image file formats to meet requirements
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> guide others capture high-quality images ensuring the required points of interest have been included assess the images taken to ensure they depict the data requested critically assess the high-quality images captured by others to provide constructive feedback give guidance on improving the images captured to ensure they depict the data requested ensure protocols are followed when storing and sharing the images taken using digital technologies convert digital image file formats to meet requirements
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> create solutions to solve complex problems integrate my knowledge to contribute to professional practice and knowledge and guide others in identifying needs and technological responses propose new ideas and processes to the field

5.2 Capturing high quality images using digital technologies (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows how to take a high-quality image in line with the images requested.• Knows how to identify the digital media images required.• Knows the different file formats used for digital designs and photo images.• Knows how to store and retrieve digital media files.• Knows the standard quality problems that can arise with digital media and how to resolve them.• Knows to be aware of the background of images that may not contain all the information and can be misconstrued.• Understand the importance of being aware of surroundings and acting safely whilst capturing images.• Understand that for an image to be processed by a program, they have to be first properly digitised such as being digitally encoded.
 <p>Skills</p>	<ul style="list-style-type: none">• Can take images promptly and to the specification instructed.• Can use digital tools to share them on to maintain the flow of data.• Can take digital photos using a digital camera, smartphone or webcam device.• Can prepare images using standard image editing features including size, crop, position and lighting effects.• Can use engineering equipment to take pictures alongside setting out.• Can provide feedback on the quality of photos others have taken.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Considers the useability of the images captured and whether they can be considered 'good data'.• Aware of the copyright and permissions that apply to the use of imported or reused digital media.• Considers the digital transformation of the UK's built environment.• Aware that good data can remove the need for paper and manual processes.• Champions the use of good quality data and its impact on analytics and intelligence.

5.3 The Golden Thread of information

To be aware of the importance of building to provided specifications. To know how to use digital tools and services to access specification and manufacturers information. To know how to create, obtain, store and share the relevant information in a digital format.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · check a digital building specification against the products supplied to install · check manufacturers specification and product installation information using digital codes found on the product · stop work and seek guidance if unsure prior to installing any product
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · obtain the relevant digital documents relating to the installation of products onto/ into a building from a common data environment · use digital tools to check that product's being installed meet the building specification provided · check manufacturers specification and product installation information using digital codes found on the product to ensure correct installation
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · request information required to ensure the correct products are installed in line with the building specification · use digital tools to check that products being installed meet those specified · provide guidance to others who are unsure of a products suitability against a specification prior to installation taking place
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · make information easily available to the right people at the right time · give access to key information required regarding the Golden Thread of building information · create, obtain, store and share documents in digital formats to contribute to the Golden Thread of building information · regularly check that the required digital documents are being stored and shared in the appropriate places and to the relevant people · promote the use of common data environments and effective information exchange and interoperability
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · collate all relevant digital building safety information on the final 'as-built' building in order to handover a building · support the implementation of common data environments and effective information exchange and interoperability · agree and share who is responsible for information gathering, creation, checking and the relevant procedures · ensure that there are strong, standardised and holistic information management systems in place throughout to create and maintain an effective Golden Thread. · propose new ideas and processes to the field

5.3 The Golden Thread of information (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Knows that the Golden Thread is information about a building that allows someone to understand a building and keep it safe.
- Knows that the Golden Thread is also the information management to ensure the information is accurate, easily understandable, can be accessed by those who need it and that it is up to date.
- Understands that the Golden Thread is a set of documents on building safety that are held digitally.
- Understands that the Golden Thread contains information on the structure of the building and any changes made to the building through refurbishment.
- Knows that the Golden Thread obligations only apply to existing buildings in scope as well as new ones.
- Knows that currently the new regime applies to buildings that are at least 18 metres in height or have at least 7 storeys and have at least 2 residential units. It also applies to care homes and hospitals which meet the same height thresholds during design and construction, but not during occupation.
- Knows that the Golden Thread Regulations define the principles of the duty holder or accountable person to maintain and store their golden thread information digitally.
- Knows that accountable persons must create, obtain, store and share documents and information relating to their building in the prescribed formats so that the building and all the people who will live in and around the building are safe, both now and in the future.
- Knows that the data needs to be verifiable – to be confirmed accurate by the ability to trace it back to the source.



Skills

- Can use digital technologies to log work completed on a building that falls into scope of the Golden Thread Regulations.
- Can use digital codes (e.g. QR Codes, NFC and RFID tags) to access BSI identify information stored about a particular product supplied.
- Use digital tools and systems to enable key information to be stored and used effectively to ensure safer buildings.
- Incorporate all the information needed digitally to understand a building and how it should be managed.
- Make information easily available to the right people at the right time.
- Can communicate the definitions and principles of the Golden Thread to others.
- Can maintain an accurate and up to date record of the buildings data.



Behaviours

- Promote the development of a culture where building safety is a core priority during a building's construction and beyond.
- Considers the digital transformation of the UK's built environment.
- Recognises that good quality, verifiable and maintained data delivers immense value by providing solid insights to support decision making.
- Recognises that the Golden Thread does not sit in isolation, but forms part of a broad national developing ecosystem of digital and data centric tools which harness the power of data to deliver benefits to all.

5.4 Gathering experience and application information ^{DT}

To demonstrate an understanding of user interface design, facilitation and people. To gather experiences and feedback from the end users. To make technology more applicable and accessible for those required to use it.

Default Users	As a default user with autonomy and appropriate guidance where needed, I:	<ul style="list-style-type: none"> · can show an awareness of how testing and reporting end user experience can add value · understand the importance of user-led design to support technology adoption
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · use different user research techniques to obtain needs and build requirements · acquire user feedback to report on current experiences with design, technology and information
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · report on user experience in relation to technology adaption · use different user research techniques to obtain needs and build requirements · create functional design and structure elements to make interfaces intuitive and engaging
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · report on user experience in relation to technology adaption · perform user testing and analyse testing results · pinpoint which choices are better/worse than others · oversee the usability and functionality of technology interfaces
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · be a leading authority on user research and design thinking with the ability to deep dive into user challenges and constraints when adopting technology · perform user testing and analysis at scale and can articulate recommendations to improve and support technology development and adoption · develop new and innovative techniques to improve functionality and increase intuitive and engaging interaction with users

5.4 Gathering experience and application information (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Knows the importance of user-led design to support with technology adoption in the workplace.• Understands the basic principles of user research and experience in relation to psychological interaction between humans and information and technology.• Understands the benefits of good user interface design to make technology more accessible.• Understands the target audience.• Knows the importance of getting information that is relevant and pertinent.• Knows that there are benefits and limitations associated with the research techniques.• Knows how to formulate search queries to achieve the desired output.• Understands advantage of the variety of knowledge, perspectives and experiences from others which can lead to better outcomes.
 <p>Skills</p>	<ul style="list-style-type: none">• Can use different user research techniques to obtain needs and built requirements.• Can undertake testing to report on current experiences with technologies and information.• Able to create functional design and structure elements.• Can perform testing and analyse the results.• Can articulate recommendations to improve and support technology development across construction.• Can tailor the information to suit the target audience.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Aspires to make technology more applicable and accessible.• Aspires to bridge the gap between data, technology and the end user.• Aims to craft intuitive and engaging user experiences.• Open to new ideas or suggestions.• Promoting the idea that good data can remove the need for paper and manual processes.

6. Smart Construction & Built Assets




6.1 Incorporating sensors into buildings, equipment and onto people

To know what sensors can do and how they can be of benefit to those working on a construction site. To know sensors can send readings to digital systems to warn individuals of potential dangers on site. To know where to place sensors in buildings, equipment and onto people to gather the required data.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> • wear sensors that record data whilst working • place sensors into buildings as specified • use digital tools to log the location of the sensors placed in a building • seek assistance when a worn sensor sends an alert to a danger to a digital technology
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> • wear sensors that record data whilst working • place sensors into buildings and onto equipment as per instructions • use digital tools to log the location of the sensors placed in a building • access the data that the sensor has recorded and make the necessary adjustments to improve ways of working and productivity
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> • place sensors into buildings, into equipment and onto people and ensure they are recording data as expected • explain needs to others to help inform the most appropriate sensors to use and where they should be placed • use digital tools to check the log of the location of sensors placed into a building is up to date and that data is being received
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> • guide others • assess needs and choose the most appropriate sensors to install to meet those needs • monitor the data from the sensors, note patterns and identify areas where improvements can be made • determine the most appropriate ways to make adjustments with the aim of improving safety and productivity of those on site • communicate the required adjustments to those carrying out the work
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> • create solutions to complex problems using the data from the sensors to inform the possible solutions • integrate my knowledge to contribute to professional practice and knowledge and guide others in identifying needs and technological responses • propose new ideas and processes to the field

6.1 Incorporating sensors into buildings, equipment and onto people (SKB)

Examples of Knowledge, Skills and Behaviours

 <p>Knowledge</p>	<ul style="list-style-type: none">• Aware that worn sensors share data on real-time performance levels, tool management, operating conditions and the physical state of the person wearing them.• Knows the types of smart building sensors (e.g. temperature sensors, humidity sensors, motion/ occupancy sensors, contact sensors, gas/air quality sensors, electrical current monitoring sensors, other sensors).• Knows that incorporating sensors into construction sites helps monitor and predict patterns and prevent problems.• Knows that worn sensors collect and share data with other devices and equipment.• Knows that sensors can help with equipment management by providing data and status reports to promote predictive repairs and maintenance.• Aware of what is meant by the term Smart Cities.
 <p>Skills</p>	<ul style="list-style-type: none">• Can wear sensors whilst working and know what data it is collecting.• Can react to alerts that a worn sensor has detected and reported (e.g. gas leak detection, air quality).• Can place sensors into buildings as specified and log where those sensors are onto digital systems using digital tools.• Can monitor the data received from sensors.
 <p>Behaviours</p>	<ul style="list-style-type: none">• Open to sensors being part of a wider preventative approach which help to save time and money and provide a more efficient site.• Open to the ways in which sensors are improving the safety and productivity of construction sites.• Aware that good data can remove the need for paper and manual processes.• Aware that using this digital technology can lower staff morale through privacy concerns, potential job losses and an over-reliance on technology.• Open to the concept of Smart Cities and reducing the resource consumption of IoT products.

6.2 Using Telematics

To know what telematics can do to help keep machinery running and manage the use and maintenance of machinery onsite. To know what else telematics can do and the insight it can give to managing multiply sites and resources.

Default Users	As a default user with autonomy and appropriate guidance where needed, I can:	<ul style="list-style-type: none"> · use devices with pre-loaded apps to record pre-start checks on machinery electronically · respond to machine alerts that are displayed on the machine and/or app
Competent Users	On my own and solving straightforward problems, I can:	<ul style="list-style-type: none"> · use devices with pre-loaded apps to record pre-start checks on machinery and access related documents · respond to machine alerts that are displayed on the machine and/or app · access telematics systems through a web portal · group machines together on a site to record site specific data · setup geofences around a site to keep plant secure and curfews to alert to movement of machinery outside of operational hours
Mindful Operators	Independently, according to my own needs and solving well-defined problems and non-routine problems, I can:	<ul style="list-style-type: none"> · monitor machine status and health, planning maintenance where required · adapt preferences within telematics systems to determine notifications sent depending on specific priorities (machines leaving their geofenced area etc.) · export data for further analysis
Selective Generalists	At selective generalist level, according to my own needs and those of others, and in complex contexts, I can:	<ul style="list-style-type: none"> · guide others · customise pre-start checklists to expand the data received in line with organisational requirements · use telematics systems to analyse the data being produced (e.g. idle time, working time, fuel use, CO2 emissions, infringements) · compare performance across multiple sites · decide which machines to allocate to which sites dependant on the types of data they can send to a telematics system · export reports from telematics systems · send and share data and trends
Skilled Innovators	At skilled innovator level, I can:	<ul style="list-style-type: none"> · analyse past data on previous projects and on other sites · make informed decisions on the distribution of machinery across multiple sites based on analytical data · ensure telematics systems have been fully utilised to reduce administration time · use the data provided to inform planning and costings more accurately for future projects · seek out opportunities to improve efficiency based on telematics data · schedule preventive maintenance and repairs from telematics data monitoring machine status · coach others to use equipment and machinery within normal parameters · drive cultural change by making operators aware where potential savings can be made through changing behaviours

6.2 Using Telematics (SKB)

Examples of Knowledge, Skills and Behaviours



Knowledge

- Knows that telematics systems use GPS technology and on-board diagnostics and monitoring to track, log and report data via mobile networks.
- Knows that telematics systems are becoming more common place and are often fitted as standard.
- Knows that systems can record all types of data which helps build a picture of what is happening on site.
- Knows that an operator's actions can affect efficiency on site (leaving machines idling which wastes fuel unnecessarily).
- Aware that Telematics systems can monitor data relating to service, operation and security of machinery.
- Aware that data from non-job machinery can also be gathered (welfare blocks, lighting towers).
- Knows that Telematics systems help organisations monitor levels of CO₂ emitted to be compliant with government limits / regulations.
- Knows that data is monitored to improve safety on site, reduce down time on machinery and improve efficiency overall.
- Knows that GPS trackers and geofencing allows a company to monitor the location of its machinery and alert them when machinery leaves site or is operating outside of set working hours (in order to protect from theft and misuse).
- Knows that location references such as What3words are used to provide more accurate location information (especially where most construction sites won't have a postcode yet).
- Aware that data from multiple machinery manufacturers can be imported into a single telematics system (mixed fleet).



Skills

- Can follow safety procedures when operating machinery knowing that the machine will record safety infringements (e.g. driving without a seatbelt on).
- Can use devices with pre-installed apps to complete pre-start checks on machinery.
- Can respond to warnings that the machine/ system alerts the user to minimise machine downtime.
- Can access required documents via an app to maximise working time (Loler certificates etc.).
- Can set notifications on telematics systems to notify when specific things occur (e.g. movement of machines outside of set working hours or out of a designated, geofenced area).
- Can monitor machine usage and check for machine overworking / underutilisation.
- Can use analytical summaries to see what is going on on-site and make changes to improve efficiency.



Behaviours

- Open to adapting ways of working which improve efficiency (reducing machine idling time to reduce fuel wastage).
- Open to going paperless and using more digital systems and services.
- Considers the safety and cost benefits of using telematics as equally as important as improving efficiency.
- Considers how people drive business systems and processes to improve efficiency and reduce administration.