Department
for Education

A Skills Classification for the UK

Plans for development and maintenance

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Glossary of abbreviations

ANZSCO Australian and New Zealand Standard Classification of Occupations

ASC Australian Skills Classification

BERT Bidirectional Encoder Representations from Transformers

DfE Department for Education

DWP Department for Work and Pensions

ERB Employer Representative Body

ESCO European Skills, Competences, Qualifications and Occupations

ESS Employer Skills Surveys

GPT Generative pre-trained transformer

HECoS Higher Education Coding of Subjects

HESA Higher Education Statistical Agency

IAG Information, Advice and Guidance

IER Institute for Employment Research, University of Warwick

IfATE Institute for Apprenticeships and Technical Education

ISCED International Standard Classification of Education

ISCO International Standard Classification of Occupations

JSA Jobs and Skills Australia

LEP Local Enterprise Partnership

LLM Large Language Models

LMI Labour Market Information/Intelligence

LSIP Local Skills Improvement Plan

NLP Natural Language Processing

NOS National Occupational Standards

OaSIS	Occupational and Skills Information System, Canada
Ofqual	Office of Qualifications and Examinations
ONS	Office for National Statistics
O*NET	US Occupational Information Network
RQF	Regulated Qualifications Framework
SCQF	Scottish Credit and Qualifications Framework
SDS	Skills Development Scotland
SES	Skills and Employment Surveys
SFw	SkillsFrameworks, Singapore
SHAPE	Social Sciences, Humanities and Arts for People and the Economy
SIC	Standard Industrial Classification
SME	Small or Medium-sized Enterprise
SOC	Standard Occupational Classification
SOC Ext	Standard Occupational Classification Extension
SPB	Skills and Productivity Board, Department for Education
SSC	Standard Skills Classification
SSDA	Sector Skills Development Agency
SSG	SkillsFuture Singapore
SUG	Sub-Unit Group (Standard Occupational Classification)
STEM	Science, Technology, Engineering and Mathematics
TOG	ONS Taxonomy Oversight Group
UFS	Unit for Future Skills, UK Department for Education
UKCES	UK Commission on Employment and Skills

Executive Summary

Overview

Skills are at the heart of some of the UK's most pressing challenges: reducing inequality, improving our productivity, and implementing the net-zero transition. Ranging from the need for basic literacy and numeracy at work, to the application of complex scientific, medical, and technical expertise, the identification and development of the skills required for our future labour force is vital. Despite the importance of this requirement, the measurement and assessment of skills in the UK remains fragmented and deficient, and the language used to describe skills is inconsistent and unnecessarily complicated. The sharing of information on skills between key agencies is hampered by these problems and a standardised classification of skills is thus long overdue. This report details how the functional requirements for a classification of skills were identified and sets out how it will be developed to meet these needs.

Skill classifications are available in other countries, but adapting them for use in the UK would previously have been a slow and prohibitively expensive process. Recent advances in Natural Language Processing (NLP) tools present a timely opportunity to combine and refine the best of the existing provision, adapting it to our needs to develop the world's best classification of skills. In turn, this would generate positive economic benefits by making the UK's workforce more adaptable, help training and education providers to be more efficient, enable employers to be more innovative and flexible, and, by simplifying re-entry and progression within the labour market, enhance employment opportunities.

What is a classification of skills and why do we need one?

A **classification of skills** is essentially a comprehensive list of all the skills and associated knowledge required to carry out job-related tasks.

When linked across occupations, qualifications and training courses, a classification becomes a powerful tool which can serve a variety of purposes, from job analysis and employee recruitment to careers advice and labour market analysis. It enables better matching between the needs of employers and the skills available in the workforce. It means that a 'skill shortage' can be both defined and identified with greater precision, enabling qualification and training providers to plan for the provision of specific skills. It provides careers guidance specialists with the tools and language to advise labour market entrants on the ways to achieve specific career pathways. From a statistical perspective, it makes possible the linking of information on skills from various sources.

When entering or moving within the labour market, individuals may want to compare the skills they already have or are interested in gaining with those required in specific jobs. A Standard Skills Classification (SSC) can help ensure that the information on skills used by employers and employment agencies in job vacancy advertising will correspond to that used by careers guidance specialists. Qualification and training providers will be able to describe the skills generated or enhanced via education and training using the same common terminology. Finally, both labour market and policy analysts, and education and training providers have an interest in identifying skills shortages and finding ways to address these. Without a classification of skills linked to occupations and qualifications, these skill gaps cannot easily be measured.

Evidencing the need for a skills classification

The need for improved and more detailed information on skills has never been greater. Between June 2022 and March 2023, the [2022 UK Employers Skills Survey](#) collected basic information on skills shortages via a telephone survey of almost 73,000 employers. This revealed that around a quarter (23%) of all employers in the UK had a vacancy at the time of the survey. One in ten (10%) had a skill-shortage vacancy (a vacancy that is hard to fill due to a lack of skills, qualifications, or experience among applicants). What the survey could not reveal was the nature of these skills in short supply.

While the need is apparent, what form would a Standard Skills Classification take and how would it be used? To assess and prioritise the requirements for a classification and to inform these questions, a survey of stakeholders was conducted, supplemented by detailed interviews with key users. Approximately 200 organisations were contacted, either because they currently use a classification of skills, produce skills information, develop career profiles, regulate standards for qualifications and/or training leading to skill formation, or have a general need for information on skills. In total, 109 organisations engaged with the online survey and the information presented below is based on a summary of these responses.

Key findings from the surveys and interviews include:

- The need for a common language when sharing information on skills was the single most important requirement.
- Despite widespread use of international classifications such as O*NET (US) and ESCO (EU), current needs are not being met. Common concerns included mismatches between definitions from these sources and their application within the UK labour market, and the lack of clarity and consistency of terminology.

- Detailed skill descriptions, short skill names, and multiple levels of aggregation within the classification were also seen as particularly important.
- Half of all responding organisations currently pay commercial providers such as Lightcast and Adzuna for skills information. This rises to over three quarters for local and regional skills bodies such as Local Enterprise Partnerships (LEPs) and Mayoral Combined Authorities (MCAs).

Table 1 shows that two thirds of all respondents stated that a standard skills classification would improve data sharing with other organisations, and a high proportion thought it would facilitate innovation and the development of new services.

Table 1: Perceived benefits of a Standard Skills Classification

Benefits to stakeholders:	% Agreement
Improved data sharing	67%
Simplified innovation	57%
Improved quality of services provided	45%
Improved quality of services received	37%
Reduced effort maintaining existing skills frameworks	36%
Improved training/management practices	32%
Reduced costs	27%
Improved quality and reach of recruitment	22%

Further detailed discussions with stakeholders were held via a series of workshops and online meetings. Strong support for a standard skills classification was unanimous. Again, the need for a common framework and terminology for skills was emphasised, allowing users to align their proprietary frameworks and reduce processing difficulties and costs when merging with data from other sources.

Examples of comments made by interviewees are shown in Figure 1.

Figure 1: Some comments from workshops and online meetings with stakeholders

'A UK Skills Classification would give us a common language to discuss skills information with other bodies. It should reflect different interests and provide for links with jobs and courses'

- Education and Qualification provider

'Skills awareness is key among our customers. A skills classification should be couched in a user-friendly language and must be publicly understood'

- Employment service designer

A number of organisations were contacted to discuss their survey responses in more detail. These quotes are typical of their comments.

'There is a need to underpin all vocational education and training courses with information on skills. There is no national standard that enables us to do this in a consistent manner'

- Occupational Standards Provider

'We currently use O*NET and ESCO for skills definitions, but we have had to adapt these for UK use. We purchase information on skills from Lightcast, as do other users'

- Taxonomy provider

Evidencing these needs, the 2022 Employer Skills Survey indicates the challenges facing the UK skills system are growing. For example, since 2017:

- Organisations with at least one skill-shortage vacancy has gone up from 6% to 10%
- The proportion of employees judged to be not fully proficient by their employer has gone up from 4.4% to 5.7%
- Employers providing training to their staff in the previous 12 months has gone down from 66% to 60%.

What would a skills classification look like?

The proposal is to construct a hierarchical classification of skills as illustrated in Figure 2 below. This will enable use of the classification at a variety of levels of aggregation depending on different users' needs. The skills classification will incorporate three hierarchical/nested levels: Skill Areas, Skill Groups, and Occupational Skills. There will also be a set of overarching Core Skills, defined as abilities utilised in most/many occupations. Underpinning the classification will be a set of occupational tasks and a range of subjects, tools, and methods which collectively encapsulate the 'knowledge' that is used within jobs.

Figure 2: Hierarchical structure of the proposed UK skills classification
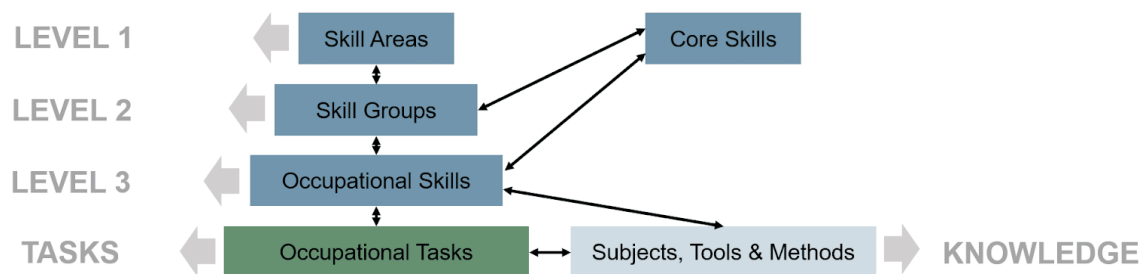
How will it be built and when will it be ready?

The UK lags behind other national and international organisations that have developed classifications of skills. For many years, the US has been developing and maintaining a system known as the US Occupational Information Network (O*NET). Similarly, the EU has the European Skills, Competences, Qualifications and Occupations (ESCO) framework. More recently Australia, Singapore, Canada and the Netherlands have all embarked upon significant work programmes to develop skill classifications. However, this slow start by the UK now means that we are well positioned to draw information from these sources and benefit from the extensive research and development work already undertaken elsewhere. Recent advances in Natural Language Processing (NLP) tools using Large Language Models (LLMs) also mean that it is timely to do so.

The latest NLP tools will be used to combine (and deduplicate) the best of existing international skills classifications such as O*NET and ESCO with UK job profile libraries, including content from the National Careers Service and IfATE Occupational Standards. Current vacancy, job description and CV data would then be used to validate and refine the outputs to produce a UK-specific classification.

While the development of a full Standard Skills Classification is envisaged to take 18 months, a 'beta version' will be made available to users for assessment and testing within the first six months.

Use cases and key benefits of a standard skills classification (SSC)

Below are specific examples of how the SSC will benefit different user types such as job seekers, employers, and Local Enterprise Partnerships. Further assessment and analysis of these use cases is presented in Section 5.

Job Seekers

The SSC would help those looking for a new job or career to:

- **Identify their transferable skills** – An online tool based on the SSC would allow individuals to upload their CV or enter their basic work history and generate a personal skills profile.
- **Evaluate their career options** – Develop a personal skills profile, either online or with the support of a work coach, which could be used to filter jobs and identify a range of suitable career options for individuals. These could include short-term employment opportunities that would provide an interim step to achieving their longer-term goals.
- **Identify their skill gaps** – If considering a specific career change, a system comparing their skills profile with a target career could identify specific skills and/or knowledge gaps and then automatically aggregate these to develop a personal development plan.
- **Choose the best course(s) to close any gaps** – A personal development plan would allow them to check formal and informal course options and compare timing, costs, and requirements. For example, they may find that there are good local opportunities in another role, that their skill gaps against this role are minor, and that they would be able to fill those gaps by completing relevant courses online and at minimal cost.
- **Consider opportunities if living elsewhere** – The SSC would allow individuals to identify regions with more demand for their skills and therefore better future employment prospects.

Employers

The SSC would help organisations to:

- **Analyse skills within their current workforce** – Basic employee role data (probably already held within their HR system) could be used to conduct a

company-wide skills audit. This would allow organisations to profile the diversity, quantity, and level of skills they already have at their disposal.

- **Identify a skills plan** – When planning expansion or an operational transition, this skills profile would enable them to quantify and prioritise skill shortages. It would also help them to systematically assess whether any employees are underutilised and would be more productive in a different role. This approach could also be applied to support specific business decisions. For example, if a firm wanted to use advanced robotics to automate more of their manufacturing process, the SSC would help identify which new skills are required to operate and maintain the new equipment.
- **Adopt skills-based recruitment** – The common language of the SSC would allow employers to articulate to recruiters and applicants exactly what they are seeking in terms of skills. It would also allow them to evaluate and sift candidates more objectively and efficiently.
- **Inform strategic decisions** – Fundamental business decisions often have a skills element that SSC-based labour market information (LMI) could help improve. For example, should a company expand on the same site or will regional differences in the supply of skills they need make it easier for them to scale production elsewhere or use multiple production facilities instead.

Local Enterprise Partnerships (LEPs)

The SSC would help LEPs and other support agencies to:

- **Analyse skills within the local workforce** – An SSC linked to occupations would enable a local skills audit to be compiled based on the employment profile of the region.
- **Identify future skills needs** – based on current and future employment patterns in the region (e.g. using projections from the DfE *Working Futures* series), the LEP could identify future skills demand, and thus potential future skill shortages, surpluses, and the key routes of transition.
- **Engage effectively with local training providers** – A common language for skills would enable LEPs to articulate clearly to training providers the current and anticipated future skill needs in the region.
- **Attract future investment and employers** – A common language for skills would also enable LEPs to provide organisations that are considering investing in the area details on current and future skills supply, and to work with them to devise plans to address any specific requirements or skill shortages.

In short, the SSC can be part of the answer to facilitating a more efficient labour market, simplify reskilling, disseminate innovation and, ultimately, improve individual agency and workforce productivity.

1. Introduction

Skills are central to some of the UK's most pressing challenges: reducing inequality, improving our productivity, and implementing the net-zero transition. Ranging from the need for basic literacy and numeracy skills at work, to the application of complex scientific, medical, and technical knowledge and expertise, the identification of the skills required for our future labour force remains key to these challenges. Despite the importance of this requirement, the measurement and assessment of skills in the UK remains fragmented and deficient, and the language used to describe skills is inconsistent and unnecessarily complicated. The sharing of information on skills between key agencies is hampered by these problems and a standardised classification of skills is long overdue[1]. This report both details how the need for a classification of skills was established and sets out how it will be developed.

Skill classifications are available in other countries. The US maintains an elaborate system known as the US Occupational Information Network (O*NET). The European Union has been developing the European Skills, Competences, Qualifications and Occupations (ESCO) framework. Australia, Singapore, Canada, and the Netherlands have embarked upon significant work programmes to develop skill classifications. Adapting these for use in the UK previously would have been slow and prohibitively expensive. However, recent advances in Natural Language Processing (NLP) tools present a timely opportunity to combine and refine the best of the existing provision nationally and internationally and adapt it to our needs to develop a world-beating classification of skills. In turn, this would generate positive economic benefits by making the UK's workforce more adaptable, help training and education providers to be more efficient, enable employers to be more innovative and flexible, and enhance employment by simplifying re-entry and progression within the labour market.

The need to classify skills arises for a variety of reasons. When moving into or through work, labour market entrants and other job seekers may want to compare the skills they already have or are interested in gaining with those required in specific jobs. A Standard Skills Classification (SSC) could help ensure that the information on skills used by employers and employment agencies in job vacancy advertising will be the same as that used by careers guidance specialists. Qualification and training providers will be able to describe the skills generated or enhanced via education and training using the same common terminology. Finally, both labour market/policy analysts and education/training providers have an interest in identifying skills

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[1] See 'Opportunities and challenges for improving labour market information on skills' Skills and Productivity Board February 2022, and 'Strategic Principle 1' in Sir John Holman's letter to DfE and DWP Ministers, June 2022.

shortages and finding ways to address these. Without a classification of skills, linked to occupations and qualifications, these skill gaps cannot easily be measured.

To address this problem, the Department for Education's (DfE) Unit for Future Skills (UFS) has commissioned plans for a common classification of skills linked to occupations and qualification/training to be developed for application across the UK. This work was set out in two phases, with Phase One focused on stakeholder engagement and the development of a plan for how such a classification could be built in a way that meets a wide range of user needs. Phase Two will focus on the implementation of this plan and the development of the classification. This report is the output from Phase One and sets out how this plan can be achieved, implemented, and validated within an eighteen-month period. This is referred to hereafter as the Phase Two plan.

The most important aspect of the proposed plan is its acceptability across the broad range of potential users, particularly for the provision of careers advice, for workforce planning by both government and business, and for labour market analysis. To determine the requirements of various users, a survey of more than 200 organisations was carried out, covering those that have a strong interest in the definition and classification of information on skills. This survey was complemented by a series of interviews with key organisations, exploring their use of skills information, their requirements for a standard skills classification, and the perceived benefits arising from use of such a classification. Details of the findings from the survey and interviews are presented in Section 3. Prior to this, Section 2 provides some definition of skills and outlines the conceptual basis of a skills classification, as well as a review of the main skills classifications currently in use in the UK and other countries.

In the light of the evidence collected, Section 4 presents the recommended design of a skills classification and describes the nature of the outputs within Phase Two of the project.

Section 5 provides a series of Use Cases, demonstrating how various stakeholders will derive benefits from links between their work and a classification of skills joined to occupations and qualifications. Section 6 outlines the plan for the construction and launch of the proposed UK Standard Skills Classification (SSC).

It is important to highlight both the scope and the limitations of the proposed approach. In terms of its scope, the proposed classification will apply to all occupations, not just to those associated with technical and manual work. It will be developed for use across the UK. Given the variations in qualifications in the four countries, this will mean that special consideration will be given to ensure that the classification will link to these different qualification structures.

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The plan outlined in this report will generate a large database of information which links together detailed information on jobs, job-related tasks, skill requirements associated with tasks, and the qualifications and training that provide the knowledge embedded within skill requirements. The need for different users to be able to understand and navigate their way easily through this database is an essential component of the work plan, requiring a significant period of testing and feedback.

The main limitation of the plan is the scale of the work involved. Building on what already exists both within the UK and more widely helps to ensure that a fully operational skills classification database can be achieved within a relatively short timescale. However, the pace of technological and organisational changes in the labour market will require the continued development and maintenance of the classification if this is to achieve and sustain its functionality. To address these dynamics, Section 7 describes plans for the maintenance and updating of the classification.

2. Current skills information landscape

This section provides definitions and categorisations of the term 'skill' currently being used by various organisations, and briefly reviews relevant skill classifications in use in the UK and in other countries.

2.1 Definitions and categorisations

Skill is a widely used term but with varying definitions of the exact meaning. Table 2 lists some definitions currently used by two of the most significant providers of skills classifications, the US Occupational Information Network (O*NET) and the European Skills, Competences, Qualifications and Occupations framework (ESCO), contrasting these with the definitions used by the Institute for Apprenticeships and Technical Education (IfATE), and the OECD. These definitions of skill share some underlying themes, notably their practical application to achieve outcomes, and that skills require development rather than being innate.

Table 2: Some definitions of skill in current use

Organisation	Definition of skill	Link
ESCO (EU Skills Classification)	The ability to apply knowledge and use know-how to complete tasks and solve problems.	https://esco.ec.europa.eu/bg/about-esco/faq?page=3
O*NET (Cross Function Skills)	Developed capacities that facilitate performance of activities that occur across jobs.	https://www.onetcenter.org/content.html
IfATE	The practical application of knowledge needed to successfully undertake the duties.	https://www.instituteforapprenticeships.org/occupational-maps/what-is-an-occupational-standard/
OECD	The ability and capacity to carry out processes and be able to use one's knowledge in a responsible way to achieve a goal.	https://www.oecd.org/education/2030-project/teaching-and-learning/learning/skills/

In the analysis and development of skills frameworks, several overlapping typologies or groupings of skills have emerged. These can help focus tools and programmes, but their inconsistency also arguably prevents clearer communication around skills. They do, however, have some common underlying themes as indicated in Table 3.

Table 3**: Skill typologies in common usage**

Type	Description	Names given to typologies
Core Skills	Fundamental capabilities essential for performing basic tasks and functions across wide range of jobs.	Basic Meta Life Essential Generic Employability Functional
Technical Skills	Capabilities required to perform practical or cognitive tasks, often related to science, engineering, IT, construction, and production.	Hard Practical Vocational Cognitive Metacognitive Physical
Behavioural Skills	Interpersonal and self-management capabilities that influence how individuals interact and work with others.	Soft People Relational Social Personal
Cross-Functional Skills	Capabilities applicable across different jobs, enabling collaboration and adaptability.	Transversal Cross-Sector Transferrable Crosscutting
Specialist Skills	Expertise and competence in a narrow, specific area or field.	Occupation-Specific

Skills are also frequently categorised by sectors, subjects, or other characteristics. Table 4 lists some of the sub-classifications that have been used by labour market or policy analysts.

Table 4: Common sub-classifications of skills

Skill Categorisations	Description
Green skills	Skills related to sustainable practices and environmental conservation.
STEM (Science, Technology, Engineering, and Mathematics)	Skills in science, technology, engineering, and mathematics disciplines.
SHAPE (Social Sciences, Humanities, and Arts for People and the Economy)	Skills related to social sciences, humanities, and arts, emphasising their impact on society and the economy.
Digital skills	Skills in using digital tools, platforms, and technologies.
Numerical skills	Skills around understanding and working with numbers and mathematical concepts.
Entrepreneurial skills	Skills required to initiate, develop, and manage new business ventures.
Innovation skills	Skills to create, develop, and implement new ideas or solutions.
Emerging skills	New and evolving skills required for current or upcoming roles and industries.
Future skills	Skills identified as essential for adapting to the evolving landscape of work and society.

2.2   Existing skills classifications: an overview

There are several skills classifications in use around the world and many have been adapted for use in the UK. The best known are the long-established US Occupational Information Network (O*NET) and the more recent EU's European Skills, Competences, Qualifications and Occupations (ESCO) system. There are also partial classifications based on a selection of UK occupations. A summary of these different classifications is provided in Table 5, while a brief description of those that are used most extensively in the UK is presented below.[2]

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[2]This is a summary of a more comprehensive review and assessment of these different classifications produced for this project by Dr Jeisson Cardenas Rubio at Warwick IER.

Table 5: Summaries of some existing skill classifications

	O*NET	ESCO	Singapore Skills Framework (SFw)	Australian Skills Classification (ASC)	IfATE	UK National Careers Service	Prospects
Job Profiles	Occupations (1,016)	Occupations (3,008)	Job Roles (1,638)	Job Profiles (1,275)	Occupational Standards (1,037) Apprenticeship Standards (745)	Job Profiles (843)	Graduate Careers (502)
Tasks	Tasks (19,281)		Key Tasks (25,479)		Duties (5,150 from 342 standards in the current format)	Day to day tasks (2,037)	Responsibilities (~4,000)
Skills	Skills (35)	Transversal Skills (92 non-language related)		Core Competences (10)			
	Generalised Work Activities (41)	Level 2 Skills (99)		Cluster Family (29)			
	Intermediate Work Activities (332)	Level 3 Skills (299)		Specialist Cluster (284)			
	Detailed Work Activities (2,087)	Level 4 Skills (10,837)	Critical Work Functions (1,894)	Specialist Tasks (2126)	Skill Statements (17,061)		Skill Statements (~5,000)

Subjects, Tools & Methods	Technology Skills (8,705)		Technical Skills & Competencies (2024)	Technology Tool Examples (257)			
	Tools Used (21,222)			Technology Tools (70)			
	Knowledge (33)	Knowledge (3,057)			Knowledge Statements (16,940)	Skills and Knowledge (2,280)	

It is interesting to note some of the commonalities apparent from the summary information in Table 5. The number of job profiles that are identified varies between approximately 1,000 and 3,000, except for Prospects, which has a focus on graduate careers. The number of sub-unit groups within the UK Standard Occupational Classification is 1,369. These correspond approximately to 'occupations' and 'occupational standards 'as defined in O*NET, ESCO, and by IfATE, and 'job roles/profiles' as defined elsewhere in this table. Skills are defined at different levels of aggregation, ranging from less than 100 at the broadest level, to several thousand at the most detailed level. None of the four major national or multinational classifications is mapped to qualifications.

2.2.1 US Occupational Information Network (O*NET)

O*NET is a US occupation-based classification system that provides detailed information about skills, abilities, knowledge, tasks, and other job-related characteristics. Occupation-specific descriptors for around 1,000 occupations, closely linked to the US Standard Occupational Classification (SOC), are updated on a continuous rolling cycle using information from professional job analysts, occupational experts, and surveys administered to incumbent workers. The conceptual framework is outlined in the O*NET Content Model[3] which captures the essence of occupations by incorporating around 250 descriptors that reflect both the nature of the job and the characteristics of the individuals performing it.

The Content Model is designed to provide a flexible framework that can be applied across different jobs, sectors, or industries, as well as within specific occupations. It consists of six domains that allow users to explore and understand the essential attributes and characteristics of workers and their occupations:

1. Worker Characteristics, including abilities, work values[4] and work styles[5];
2. Worker Requirements, including skills, knowledge, and prior education;
3. Experience Requirements, including basic skills, cross functional skills, and prior experience;
4. Occupational Requirements, including broad and specific work activities and work context;
5. Occupation-Specific Information, including occupation-specific tasks and tools/technologies;

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[3] https://www.onetcenter.org/content.html

[4] Aspects of work composed of specific needs that are important to a person's satisfaction.

[5] Personal characteristics that can affect how well someone performs a job.

6. Workforce Characteristics, including occupation-specific Labour Market Information (LMI) and future prospects.

O*NET supports a wide range of users, including individuals making career decisions, job seekers, employers, human resource professionals, educators, and researchers. It offers a standardised framework for understanding and comparing occupations, facilitating career exploration, workforce development, job matching, and other applications related to the world of work. Moreover, O*NET has served as a starting point for the development of other classifications such as the Australian Skills Classification (ASC) and Canada's Occupational and Skills Information System (OaSIS).

2.2.2 European Skills, Competences, Qualifications and Occupations (ESCO)

ESCO[6] is the EU's multi-lingual classification of competencies required for different occupations in the European labour market. It is based on the understanding that skills, competences, qualifications, and occupations are interconnected and should be described in a coherent and harmonised manner. It also recognises that skills and competences are not only acquired through formal education but also through work experience, non-formal learning, and informal learning.

ESCO is organised around three 'pillars': occupations, skills (encompassing skills, knowledge, and competences), and qualifications. It provides descriptions of around 13,500 'skills' (many are occupation-specific) for 3,000 occupations. Skills are specific abilities and knowledge required to perform tasks and activities, while competences encompass a broader set of attributes, including skills, knowledge, and personal qualities that enable individuals to successfully perform in a given context. Both occupations (which are mapped to the International Standard Classification of Occupations – ISCO-08) and skills can be hierarchically grouped and thus aggregated to higher levels. As yet, the qualifications pillar, which would link skills and occupations to qualifications, is undeveloped.

The ESCO structure is intended to facilitate labour market transparency, support the matching of skills and job opportunities, enhance career guidance and mobility, and foster lifelong learning and skills development across Europe[7].

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[6] https://esco.ec.europa.eu/en

[7] European Commission: ESCO strategic framework. Vision, Mission, Position, added Value and guiding Principles. https://esco.ec.europa.eu/uk/about-esco/publications/publication/esco-strategic-framework.

2.2.3 The Australian Skills Classification (ASC)

The ASC builds on the Australian and New Zealand Standard Classification of Occupations (ANZSCO) and identifies and classifies the specific skills, knowledge, and capabilities required for different job roles. It focuses on categorising and organising skills and knowledge required for different occupations based on the competencies and abilities needed to perform specific tasks and responsibilities. The ASC is a new classification (first version was launched in March 2021) and is still being developed; it is a product of the National Skills Commission (NSC), now incorporated into Jobs and Skills Australia (JSA). It incorporates data from multiple sources, including O*NET and existing skills classification systems in Australia. The development process involved rigorous validation and refinement, leveraging employer surveys, Australian job advertisement data, and education and training course documentation, and uses both machine learning and human expertise in its construction. Currently, the ASC provides details for around 1,300 occupations, with information on:

- 10 Core Competencies - generic and transferable skills covering all occupations, graded from 1 to 10;
- c. 2,000 specialist tasks – the work activities and tasks carried out on a regular basis;
- c. 70 different technology tools – software and hardware used in occupations.

The ASC is hierarchically organised: the specialist tasks are grouped into around 300 specialist clusters and 29 cluster families to enable users to explore the transferability of skills between jobs. JSA is also developing a comprehensive range of interfaces and dashboards to enable users to interact with the ASC.[8]

2.2.4 Singapore Skills Frameworks (SFw)

SkillsFuture Singapore (SSG) has developed a set of 34 industry sector Skills Frameworks (SFw) which describe the generic competencies, work functions, tasks, technical skills, and competencies of different occupations within each sector. Unlike the classification systems described above, industry sector (rather than occupation) has primacy in the SFw. The SFw are very comprehensive, and collectively include: 16 generic skills and competencies applicable across all jobs (scaled using basic, intermediate, and advanced), around 2,000 technical skills and competencies (with proficiency levels from 1 to 6), and 25,000 key tasks or skills (which are hierarchically clustered into 5 levels) for 1,600 occupations. The level of detail and specificity in the SFw is impressive.

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[8] See, for example, https://www.nationalskillscommission.gov.au/australian-skills-classification

2.2.5 NESTA

In 2018, Nesta created the first solely data-generated skills classification by analysing and aggregating text from online job adverts. In 2022, they released an improved open-source version of this and the code used to develop it. Many of the emergent concepts are focused on specific tools or subjects (e.g. 'javascript-css-html' or 'payroll-tax-vat') and arguably the language is less accessible than more traditionally developed classifications.

The tool demonstrates how automated analysis and aggregation of UK job advert data can be used to identify, cluster, and structure skills information at scale. However, in isolation, the outputs from this approach are somewhat abstract, and this approach may be better suited as a means to complement or validate other skills classifications.

2.2.6 Skills Builder

The Skills Builder Universal Framework[9] is a tool for measuring and building essential skills[10]. It breaks the 8 essential skills down into a sequence of steps, starting with absolute beginner through to mastery. It was originally developed for UK schools but has since been extended to support employers. It is currently used internationally by over 850 employers, schools, and social impact organisations.

2.3 Key UK skills information sources

There is no systematic and comprehensive assessment of the different skills that are used in employment in the UK. For example, the ONS does not currently employ a classification of skills, relying for most purposes on the four broad skill levels associated with the structure of the Standard Occupational Classification (SOC) or variations of this. Skill levels are distinguished by the length of time required for a person to become fully competent in the performance of the tasks associated with a job. This is a function of the time taken to gain necessary formal qualifications, or the required amount of work-based training. Some tasks also require experience for acquiring competence. This is therefore a very high-level classification.

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[9] Skills Builder Universal Framework https://www.skillsbuilder.org/universal-framework

[10] The eight 'essential' skills are: listening, speaking, problem solving, creativity, staying positive, aiming high, leadership, and teamwork.

The Institute for Apprenticeships and Technical Education (IfATE) has developed information on skills associated with their occupational (apprenticeship) standards[11]. These are typically statements describing skills associated with one or many duties within a given occupational standard. By definition, they do not cover all occupations. They do provide information on technical and/or vocational qualifications associated with the occupations defined within each standard. They apply across the UK.

Finally, there are also the National Occupational Standards (NOS). Originally designed to apply to the UK, these standards are now maintained for Scotland, Wales, and Northern Ireland. Skills Development Scotland, Careers Wales, and the Department for the Economy, Northern Ireland collaborate to maintain and develop a set of occupational standards, defined as detailed descriptions of the knowledge, skills, and understanding an individual needs to be competent at a job[12].

Detailed skills information for the UK has also been gathered from series of irregular, often small-scale surveys of workers (e.g. the Skills and Employment Surveys (SES)), or from bespoke surveys of employers (e.g. Employer Skills Surveys (ESS)), which are necessarily partial and cannot provide any assessment of job-specific or individual-specific skills. Such surveys are also often too limited in scale and scope to permit any detailed spatial disaggregation.

2.4   Contrasting current and proposed skills classification landscapes

As this brief review reveals, the current landscape of skills classifications is complex and difficult to navigate. In places it borrows material from other national or multinational classifications to flesh out the detail that is required by users. This, in turn, leads to dissatisfaction with the terminology. As a result, there is no common language within the UK via which users and producers of information on skills can exchange information, limiting their ability to communicate key concepts, such as the definition of a 'skills shortage'. As will be evidenced in the next section of this report, organisations such as Adzuna and Lightcast are relied upon by many agencies to provide information on employer skill requirements from job vacancy advertising, but the classification of the skills information provided must be tackled on an agency-by-agency basis. This is inefficient and wasteful of resources.

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[11] IfATE Apprenticeship Standards https://www.instituteforapprenticeships.org/apprenticeship-standards/

[12] https://www.economy-ni.gov.uk/sites/default/files/publications/economy/national-occupational-standards-strategy-2022-and-beyond.pdf

Figure 3 provides a graphical representation of the current skills landscape.

Figure 3: Current skills classification landscape
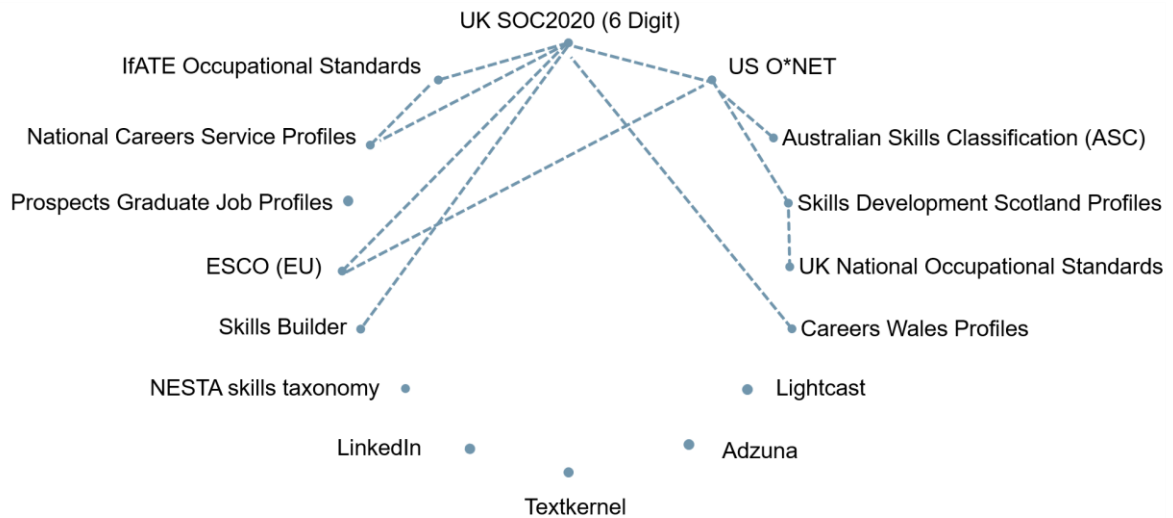
Figure 4: Proposed Standard Skills Classification (SSC)

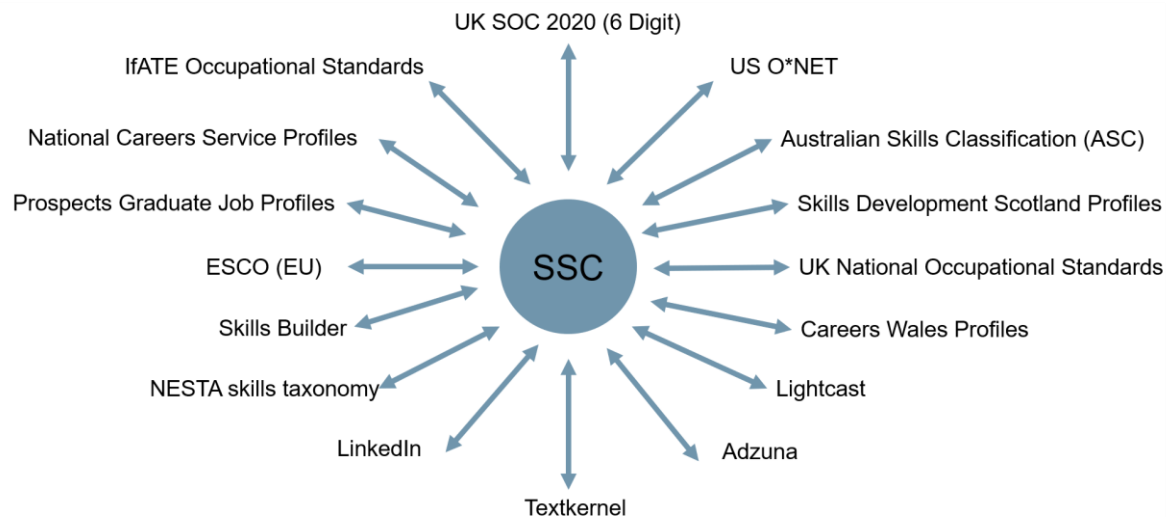Figure 4 illustrates how the proposed UK Standard Skills Classification would unify this landscape by providing a centralised resource for skills information, its classification and dissemination to users.

2.5 Recent technical advances

The use of Artificial Intelligence (AI) in the development and refinement of skills classifications has been growing over the last decade. However, until recently, the

tools required expert configuration and large amounts of human effort to check and refine outputs. Since 2020, advances in publicly available language model tools (e.g. [GPTs](#) and [BERTs](#)) have seen a radical performance improvement in natural language processing (NLP) and generation. Developments in the following areas are of relevance to building a skills classification:

1. Text Extraction: Retrieving specific pieces of information or content.
2. Text Cleaning: Pre-processing textual data to eliminate noise, irrelevant information, and formatting inconsistencies.
3. Text Matching: Identifying similarities or patterns between different text sources.
4. Text Clustering: Grouping similar texts together based on their meaning or other characteristics.
5. Text Merging: Combining multiple texts into a single cohesive document or statement.
6. Text Tagging: Assigning labels or tags to specific elements within a text. It is closely related to named entity recognition and sentiment analysis.
7. Text Generation: Creating new, contextually relevant, and coherent text based on a given prompt.

This means that combining, refining, and extending existing skills classifications has become far easier, and represents a huge improvement to the viability, timing, and cost-effectiveness of this project. There are however still legitimate concerns about the accuracy and reliability of AI generated content (e.g. factual errors caused by hallucinations) and outputs would require the same level of validation as human authored content.

2.6 Summary

There are several job (i.e. occupation) profile information databases (e.g. IfATE (c. 1,000 standards), National Careers Service (c. 800 profiles), and NOS (c. 2,500 standards)) that are currently in use. The design, development, and functionality of these offer vital lessons about the definition, categorisation, and profiling of employment-related skills. However, the purposes for which these job profiles are produced differ (e.g. identification of skills for qualification design, or features of jobs for careers advice and guidance, or design of assessment criteria etc.). This can mean that they are not necessarily fully representative of the occupations or tasks to which they are assigned. Moreover, there is limited consistency and alignment across the different frameworks in use, and the level of specialism is inconsistent both within and between the existing job profiles. A common classification of skills would provide a unifying framework, reducing duplication (of existing coverage, and of effort), while facilitating the extension existing frameworks to be more comprehensive in their coverage.

Existing skills classifications and information sources from the UK and internationally contain many high-quality components that a UK skills classification could usefully draw upon. There are, however, also structural weaknesses and gaps that need to be resolved in order for any new UK-specific classification to realise its potential benefits. For example, all of the existing skills classifications have so far failed to establish comprehensive linkages between skills and detailed qualifications.

In recent months, natural language processing technologies have become far more sophisticated and represent a crucial tool that can be used in designing and implementing these refinements. The proposed work programme for Phase Two will exploit these technological developments and new tools to assist in merging, de-duplicating, and linking information on skills derived from a wide variety of different data sources to develop a UK-specific classification.

3.   Stakeholder Engagement

3.1   Approach to stakeholder engagement and research methods

An important aspect of the development of the proposed plan was to ensure that it will generate outcomes that meet the needs of a variety of users. Assessing these needs and understanding the ways in which different organisations develop and use information on skills was key to this. An online survey distributed to potential stakeholders captured basic information about the ways in which they make use of or require information on skills. This was supplemented by a series of more detailed face-to-face and online interviews with a subset of stakeholders, exploring in more depth the ways in which they might contribute to and/or make use of a standard skills classification. A list of these organisations and interactions is provided in Appendix A.

3.2   Survey findings

Approximately 200 UK organisations were identified as potential stakeholders, either because they currently use a classification of skills, produce skills information, develop career profiles, regulate standards for qualifications and/or training leading to skill formation, or have a general need for information on skills. An online survey was developed, and invitations to participate were sent by the research team or the Unit for Future Skills (UFS), depending upon the best contact details. Respondents were requested to complete the questionnaire on behalf of their organisation, rather than their personal views. Topics included: current usage of skills information, views on the attributes they would like to have included in a skills classification, and the benefits and costs of transition to a standard classification of skills. In total, 109 organisations engaged fully with the online survey and the information presented below is based on a summary of these responses.

Table 6 groups responding organisations into seven distinct categories[13].

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[13] For further details about the nature of these groups, see Appendix A.

Table 6: Survey of skill needs and use by respondent group

Respondent group	No. of respondents	No. contacted	Response rate (%)
Education and qualification providers	8	17	47
Employers and representative bodies	30	46	65
Employment service designers and providers	10	15	67
Local and regional skills bodies	41	87	47
Occupational Standards/skills data providers	4	4	100
Policy users	12	24	50
Taxonomy providers	4	10	40
Total	**109**	**203**	**54**

The two largest groups of respondents are 'Employers and representative bodies', and 'Local and regional skills bodies'. The smallest of the groups – 'Occupational standards/skill data providers' and 'Taxonomy providers' – each have responses from four organisations.

Responding organisations provided information about their current use of skills information, the essential features they would like a skills classification to possess, the sources of skills information they currently use, and the perceived benefits of a standard classification of skills. Appendix tables C1 to C4 show detailed responses to survey questions on these topics. The main findings are summarised below:

- The most common **current uses** of skills information by all organisations are for the analysis of skills supply and demand, creating labour market information, and for the identification and forecasting of future skills. Another important use, indicated by well over half of all respondents, is for developing career or occupational profiles.
- In terms of the **essential features** that a standard classification of skills should possess, the mapping of a proposed classification of skills to both occupations and to courses/qualifications was indicated as an essential feature by the majority of respondents. Detailed skill descriptions, short skill names, and multiple levels within the classification structure were also seen as essential components.
- Across all stakeholders responding to the survey, the two most heavily used **current sources** of information on skills are the IfATE apprenticeship standards and occupational maps, and vacancy skills information provided by organisations such as Lightcast, Adzuna etc. O*NET skills information is used

predominantly by employment service designers/providers and occupational standards/skills data providers. The UK National Occupational Standards (NOS) and the National Careers Service job profiles are used quite extensively by local and regional skills bodies.

- When asked to state whether a UK skills classification would **provide benefits** to their organisation in various ways, 65 percent of respondents of all types agreed that it would improve the sharing of data between organisations while 57 percent indicated that it would facilitate innovation and the development of new services. Approximately half of employment service designers and providers, local and regional skills bodies, occupational standards providers, and policy users stated that it would improve the quality of existing services.

3.3   Findings from stakeholder workshops and online engagement

While the online survey of stakeholders provides evidence of the need for a standard skills classification, particularly the benefit of sharing information between different organisations, the responses may not effectively demonstrate the enthusiasm or concerns that some of the major stakeholders have over its introduction within their organisations. For this reason, a series of workshops with groups of stakeholders, and online meetings on a one-to-one basis were held[14].

Across the wide variety of organisations that we consulted, several common themes emerged when discussing issues relating to defining, measuring, and utilising information on skills in the UK. These include:

- Recognition of the **costs involved in implementing a standard classification** or aligning current systems with a national standard. As a national careers service provider put it, while the costs of implementation and aligning with a national standard may be significant, the benefits arising from a common interpretation of skills information would outweigh these costs.
- A common standard could encourage existing data providers to **align their outputs,** thereby reducing reliance on their proprietary frameworks and reducing processing costs when merging with data from other sources.
- Recognition that **stakeholders vary in their needs for skills information**. Some require considerable granularity (e.g. careers information providers), while others need information aggregated into forms suitable for analysis (e.g. investigating national and regional variations in IT skills).
- Some users, particularly careers service providers, emphasised the need for a **classification of skills to be dynamic** (perhaps using real-time information)

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[14] See Appendix B for details.

and flexible so that it can capture new and emerging skills and changing skills utilisation in response to new technologies.

- Those agencies responsible for the development of standards and the regulation of qualifications and training saw **significant benefits in linking these to skills**. Where this has already been achieved in some areas (e.g. apprenticeship standards), the proposed classification and these linkages should be preserved where possible, but extended to cover the full range of qualifications across the countries of the UK.
- There was considerable emphasis on having a **common, consistent, and comprehensive language** to describe skills that would be of immediate benefit. However, it is important to recognise that the language employed needs to be appropriate to different users, and care needs to be taken to provide descriptions of skills in language that is accessible to all users.

3.4 Summary

A skills classification linked to qualifications and jobs would enable individuals to more easily understand the skills that they have or could develop and to discover the education/training pathways that they could take. A standardised classification will help to provide a bridge between the advice that students receive from schools, teachers, parents, FE/HE sector participation, careers counsellors etc, and their employment outcomes. The alignment of different courses and qualifications with skills could enable individuals to make more informed choices at all levels. A standard classification could also provide a better understanding of the significance of unregulated qualifications, private training, and micro-credentials.

There are many different ways that skills can be organised – by sector, occupation, types of skills (e.g. entry/basic skills, green skills, digital skills, academic vs vocational) etc. There are cross-cutting skills, with transferability between sectors, but also industry-specific elements as well as technical areas of specialisation; all of these should be accommodated if possible. Integration of a skills classification with the standard classification of occupations will enable other sources of labour market information to be utilised to better understand the labour market context, for example, the supply of and demand for skills and consequently skill shortages/gaps.

Where there were concerns raised about the development and implementation of a standard skills classification, these related primarily to the need to preserve the best of what already exists in terms of skill maps and linkages to occupations and qualifications. However, adoption of a standard skills classification would likely be an incremental process as organisations update their use and provision of skills information and revise the databases that they employ. While some organisations indicated that this could possibly lead to them incurring additional costs, the benefits were widely regarded as outweighing these costs.

Finally, a significant benefit provided by a UK-wide standard skills classification is more cost-effective solutions for information provision on skills. The costs of existing commercial careers/skills information services and resources are a significant burden on the budgets of public and social sector organisations. A standard skills classification would simplify the development of free or near-free tools to reduce this burden.

4. Recommended design and deliverables

This section describes the overall structure and content of the proposed skills classification, including how it will enable linkages between jobs, skills, qualifications, and courses.

4.1 Overview and definitions

The working title for the proposed classification framework is the UK **Standard Skills Classification** (SSC), to parallel the language used for the Standard Occupation Classification (SOC) and the Standard Industrial Classification (SIC). The proposed classification combines, refines, and extends the best of existing classification systems, in particular O*NET, ESCO, and the Australian Skills Classification (ASC). These are well-established frameworks, and a UK skills classification which is derived from these will both save time and map more easily to them, a key factor in simplifying and encouraging adoption by existing users. The content of these frameworks is not, however, without limitations, and the UK TOG (Taxonomy Oversight Group)'s Best Practice Framework will be used to address these limitations. In particular:

- Removing duplicate or similar concepts to reduce ambiguity.
- Adopting clearer and more consistent language to improve both human and machine readability.
- Mapping skills to tasks rather than directly to standard occupational profiles to create an adaptable job definition framework.
- Adding in-depth categorisation of knowledge and expertise to enable linking between jobs and qualifications.

Skills

It is proposed that a skill is (broadly) defined as: 'A capability enabling the competent performance of a task'. This is on the basis that skills:

- Are a means to an end (i.e. they enable rather than embody performance).
- Are capabilities and not attitudes or outcomes. 'Ensuring customer satisfaction' or 'maintaining a positive outlook' would therefore not be classified as skills.
- Are developed and are not innate. For example, a good sense of smell is not a skill although the ability to use it to evaluate the quality of foods would be.
- Generally define the 'What' in the context of real-world activities (i.e. what is being done), as opposed to the where, why, or how.

Examples:

- Install heat pumps
- Administer standardised psychological tests
- Manage software development projects

Occupational Tasks

An occupational task is defined as 'A job-related activity that typically requires the use of one or more skills. This may relate to a specific context and/or require the use of particular tools or methods.'

- Tasks generally describe the application and combination of skills to achieve a desired outcome. They are more likely to include the where, why, and how.
- Some tasks are routine and require minimal time and effort to perform with competence.

Examples:

- Install and maintain ground-source heat pumps for large commercial premises.
- Administer and interpret standardised psychological tests to assess patients' mental health.
- Manage large-scale client software development projects using the Scrum framework.
- Sort and distribute any incoming post or packages within the office (example of a generally unskilled task).

Core Skills

Core skills are defined as foundational capabilities that enable the competent performance of tasks across multiple areas of work, such as digital literacy or numeracy.

4.2 Design concept, scope and structure

4.2.1 Conceptual basis

The conceptual basis of the UK Standard Skills Classification will be the same as those that structure of the UK Standard Occupational Classification: *Skill levels* and *skill specialisations*. It will only differ in that these concepts will be elaborated in much greater detail within the structure of the SSC.

Skill levels in SOC2020 follow those defined in the International Standard Classification of Occupations (ISCO08)[15], which equates each level with the length of the educational and/or training programme that provides the skills and knowledge required for competent performance of the tasks in a job. This concept of 'time to competent performance' is approximated via the levels of the International Standard Classification of Education (ISCED11)[16]. Appendix E shows the four skill levels of the UK SOC2020, the associated levels of ISCED11 and the corresponding 'complexity levels' of the Regulated Qualifications Framework (RQF) which cover all registered qualifications in England, Wales and Northern Ireland.

By adopting skill levels as an underlying conceptual principle for the structure of the SSC, mapping to the frameworks for qualifications[17] will match each skill level of the SSC to the associated 'complexity levels' within these frameworks.

Skill specialisations in the SSC will be defined in a variety of ways, including sectoral specialisations (e.g. vehicle engineering and maintenance skills), and subject specialisations (e.g. language skills).

4.2.2 Scope

The classification is principally focussed on the identification and mapping of the tasks, skills, and expertise related to UK 'jobs'. For development purposes, jobs will be defined as the ONS Standard Occupational Classification Sub-Unit Groups (SUGs)[18], although the skills mapping being based at the task level means that the framework can be extended to include profiles for occupational specialisms and hybrid roles.

While the focus is primarily on work-related skills, it is recognised that worker wellbeing and human flourishing requires a broader skill set. The classification will therefore also accommodate mappings to other skill frameworks such as needs-led curricula[19] used in schools for children with complex needs.

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[15] See https://www.ilo.org/public/english/bureau/stat/isco/isco08/

[16] See https://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

[17] In England, Wales and Northern Ireland this is the Regulated Qualifications Framework. In Scotland it is the Scottish Credit and Qualifications Framework (SCQF).

[18] Excluding Sub-Unit Groups with the /99 suffix used for occupations 'Not Elsewhere Classified' (n.e.c.). By their nature these groups usually contain a mixture of profiles and cannot be defined coherently.

[19] Example Needs Led Curriculum Skills Framework - https://stdominicsschool.org.uk/curriculum/needs-led-curriculum/

4.2.3 Structure and primary components

Figure 5 illustrates how the framework will link jobs to courses and qualifications, via tasks and skills/knowledge:

Figure 5: Linkages between jobs, tasks, skills, and qualifications
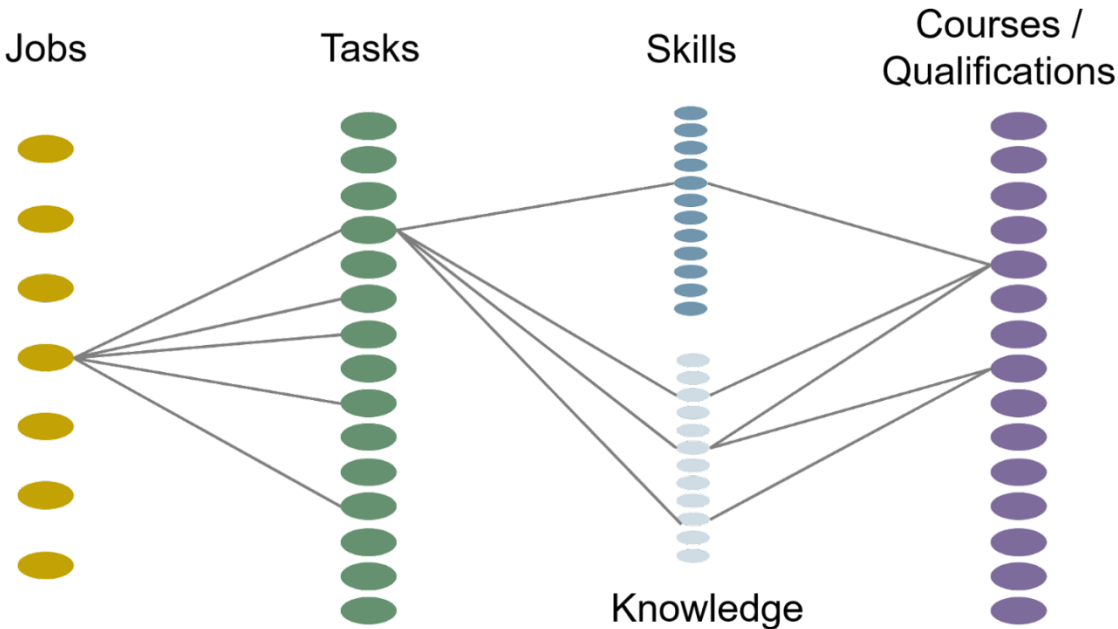
Stakeholder engagement confirmed that the UK SSC should have a hierarchical structure, enabling use at a variety of levels of aggregation depending on user needs and data limitations. The SSC will therefore include three hierarchical levels: Skill Areas, Skill Groups, and Occupational Skills. Figure 6 presents the proposed hierarchical structure and content of the classification.

**Figure 6: Proposed structure of the Standard Skills Classification (SSC)**
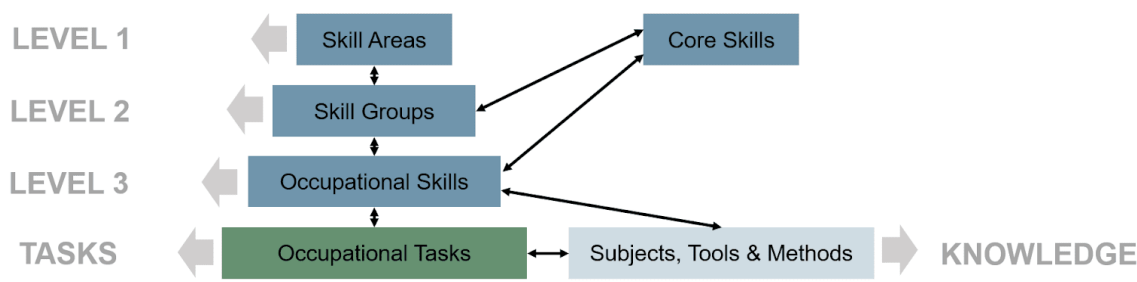
To comply with the TOG principle of balance, each parent group will map to approximately ten sub-groups. Mappings will not be restricted to a strict one-to-one relationship and will instead also accommodate secondary matches. For example, the analysis of sales data may relate primarily to an analytical skills group, but it may

also have a secondary mapping to the one around marketing strategy. Figure 7 shows this structure and the level of detail/granularity proposed at each level.

Figure 7: Hierarchical structure of the UK SSC
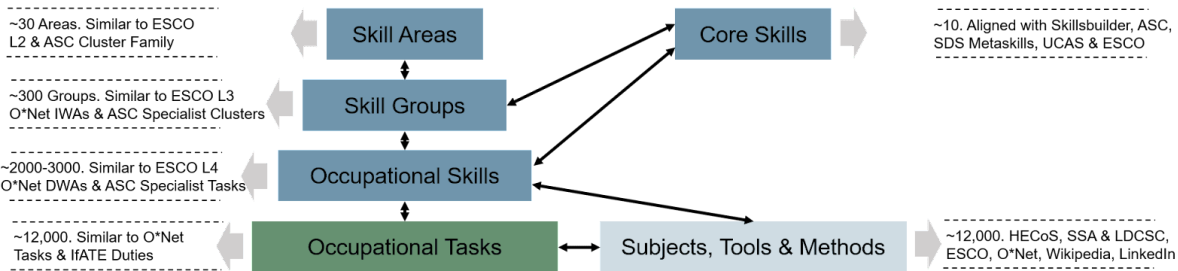
As described in the following subsections, there will be c. 10 over-arching 'Core Skills', c. 30 broad 'Skills Areas', c. 300 'Skills Groups', and c. 3,000 'Occupation-specific skills'. Underpinning this hierarchy of skills will be a set of c. 10-12,000 Occupational Tasks linked with the subject knowledge, methods, and tools required to accomplish these tasks. Each of these elements is briefly described in Table 7 below and in the following subsections.

Table 7: Structural components of the Standard Skills Classification

Level	Description	O*NET Example	ESCO Example	ASC Example
Skill Areas	These are broad skill domains that relate to most occupations and sectors. There will be approximately 30 in total, similar in detail to the Generalised Work Activities in O*NET, the Level 2 skills, in ESCO and the Cluster Families in the ASC.	4.A.2.b.1 Making Decisions and Solving Problems	S2.1 Conducting studies, investigations, and examinations	2104 Operating procedures and processes
Skill Groups	These are intermediate skill domains that relate to numerous occupations and sectors. There will be approximately 300 of these in total, similar in detail to the Intermediate Work Activities in O*NET, the Level 3 skills in ESCO, and the Specialist Clusters in the ASC.	4.A.2.b.1.I06 Diagnose health conditions or disorders	S2.1.2 Diagnosing health conditions	210422066 Develop and administer testing routines or procedures
Occupational Skills	These are specific skills that relate to a small number of occupations. There will be approximately 2,000 of these, similar in detail to the Detailed Work Activities in O*NET, the skills level 4+ in ESCO, and the Specialist tasks in the ASC.	4.A.2.b.1.I06.D03 Diagnose neural or psychological disorders	S2.1.2.x Conduct Psychological Assessments	210422066230637 Administer standardised physical or psychological tests
Occupational Tasks	These are job-related activities that typically require the use of one or more skills. They relate to performing a task in a particular situation and/or using specific tools or techniques. There will be approximately 10-12,000 of these in total, similar in detail to the task statements in O*NET and duties in the IfATE Occupational Standards.	Identify psychological, emotional, or behavioural issues, and diagnose disorders using information obtained from interviews, tests, records, or reference materials		

Core Skills

These are foundational capabilities that enable the competent performance of tasks across all areas of work. There will be c. 10 of these in total. A review and summary of the existing core skill frameworks in other skills classifications that are in use in the UK and internationally is presented in Appendix D. This suggests a provisional list for the UK SSC as:

- Oral Communication
- Creativity and Innovation
- Planning and Organising
- Working with others
- Leadership
- Active Listening
- Learning and Researching
- Digital Literacy
- Numeracy
- Writing

These will incorporate five broad levels of proficiency:

- None/Insignificant
- Low/Basic
- Medium/Intermediate
- High
- Very High/Advanced

For reference, the table in Appendix D also shows how these constructs could map to existing core/essential skill classifications, such as Skills Builder.

Knowledge (Subjects, Tools & Methods)

These relate to the knowledge components of a skill and are intended to help define the learning required to develop competence. Knowledge is defined separately since having 'skills-related knowledge' is not the same as 'being skilled'. For example, having knowledge about cataract surgery is different from being a competent ophthalmologist. Applying skills also uses toolsets and techniques that evolve over time, and the framework needs to be flexible enough to accommodate these changes, especially as these are a key driver of productivity gains and are more commonly replaced than skills. A prototype directory of c. 11,000 concepts already exists and is currently being used by Innovate UK's Workforce Foresighting Hub. This was created by matching and deduplicating existing knowledge-related terms across the following classifications:

- [ESCO](#) (Knowledge)
- O*NET ([Knowledge](#), [Tools Used](#) & [Technology Skills](#))
- Wikipedia (Article Titles)
- LinkedIn (Skill/Subject Tags)
- [Stack Exchange/Overflow](#) (Topic Tags)
- [HECoS](#) (Higher Education Coding of Subjects)
- [LDCSC](#) (Learn Direct Classification of Subject Codes)
- [The Ofqual Register](#) (Terms used in qualification titles or unit learning outcomes)

In Phase Two, this prototype directory will be regenerated using the updated versions of these classifications along with additional metadata including:

- A Concept Description
- Concept Types (i.e. whether a subject, tool and/or a technology)
- Alternative Labels
- Sector Subject Area (SSA)
- Subject Size
- Related Subjects/tools (e.g. ReactJS and Vue.JS)
- Parent Subjects/Tool Types (e.g. ReactJS is a JavaScript Framework)

This part of the classification could serve many useful purposes but the key one will be the precise linking of courses and qualifications to skills and tasks and, in turn, jobs. This will primarily be done by analysing course descriptions, curricula and learning outcomes to generate standard skill and knowledge concept profiles. These will then be used to identify links to occupational tasks and match ranking associated jobs through an aggregate measure of knowledge similarity.

4.3   Nomenclature

The TOG Best Practice Framework principle of well-defined terms specifies that "Terms within the taxonomy should strive to be unambiguous and mutually exclusive". To this end the skills and concepts classified will be developed according to several key criteria:

- Short primary labels: The primary skill labels will be as concise as possible while remaining distinct from similar skills and making sense to users without further explanation (i.e. minimal use of jargon). This will improve both ease of communication and visual display (e.g. enable display as skill 'tags').
- Consistent language structure: In the case of skills, this means that an occupational skill label will begin with a specific and active verb noun pair e.g. "Design relational databases" or "Monitor audiences for security or safety threats" instead of "Database Design" or "Ensure Audience Safety".

- Simple language: Where possible, phrasing will comply with the [GOV.UK writing guidance](), including a target reading age of 9 years. For some advanced technical skills this may not be possible as it will overly compromise definitional brevity and precision. This is where alternative labels may be necessary to communicate concepts to different audiences.
- Disambiguated acronyms: Where both an acronym and unabbreviated form are in widespread use, both will be given in the primary label. This is especially the case if the acronym has more than one meaning. For example, NLP (Natural Language Processing) which could also refer to Neuro Linguistic Programming.

4.4   Metadata (e.g. descriptions, skill level)

To enable clearer understanding and easier identification of skills within the classification, each concept will have an associated:

- Detailed description: A one or two sentence description of the skill, including any key alternative names for key concepts (e.g. Forensic science also being known as criminalistics) and, where appropriate, context about where, how, and why the skill is typically applied.
- Alternative names/labels: A comprehensive (although not necessarily exhaustive) list of different terms for the same concept (e.g. CAD; Computer-Aided Design; Computer-Assisted Design).
- Skill complexity: A numerical value indicating the amount of training and expertise required to become competent in a particular skill. This will be given on a 1-5 scale, broadly aligned to the existing O*NET Job-Zone categories based on job preparation time. These levels will also be cross-mapped to the various national frameworks for educational levels.

4.5   Mappings

The primary mappings between jobs, tasks, skills, and qualifications are shown in Figure 5. These will be the primary mappings to link the key concept types and will be extended to provide the following crosswalks:

- Occupational Tasks to:
  - Occupations
    - Include a match score to indicate the strength or probability of the relationship (Title and precise definition to be determined in Phase Two)
    - Include a precise numerical score also banded to medium, high and very high (e.g. values 40-60 = medium, 61-80 = high, 81-100 = very high)

- o Occupational Skills
  - ▪ Essential vs. Optional
- o Knowledge
  - ▪ Essential vs. Optional
- o Core Skills
  - ▪ Include 1-5 Proficiency Level or Range

- Occupations to:
  - o Occupational Skills
    - ▪ Include Significance/Match Score (inferred by aggregating the task to occupation match score)
  - o Knowledge
    - ▪ Include Significance/Match Score
  - o Core Skills
    - ▪ Include 1-5 Proficiency Level
  - o Related Occupations
    - ▪ Including a match score and a list of shared skills, skill groups, and key knowledge areas

- Courses & Qualifications[20] to:
  - o Skills (at every level of aggregation)
  - o Knowledge
  - o Occupations Tasks (via skills & knowledge)
  - o Occupations (via occupational tasks)

An example of all proposed mapping routes between a job profile and qualifications is shown in Figure 8. Additional details about the mappings are also included in Appendix F.

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[20] This would likely include units within the RQF (Ofqual Register) and SCQF, and higher education courses mapped against HECoS.

Figure 8: Linkages between jobs, skills, knowledge, and qualifications
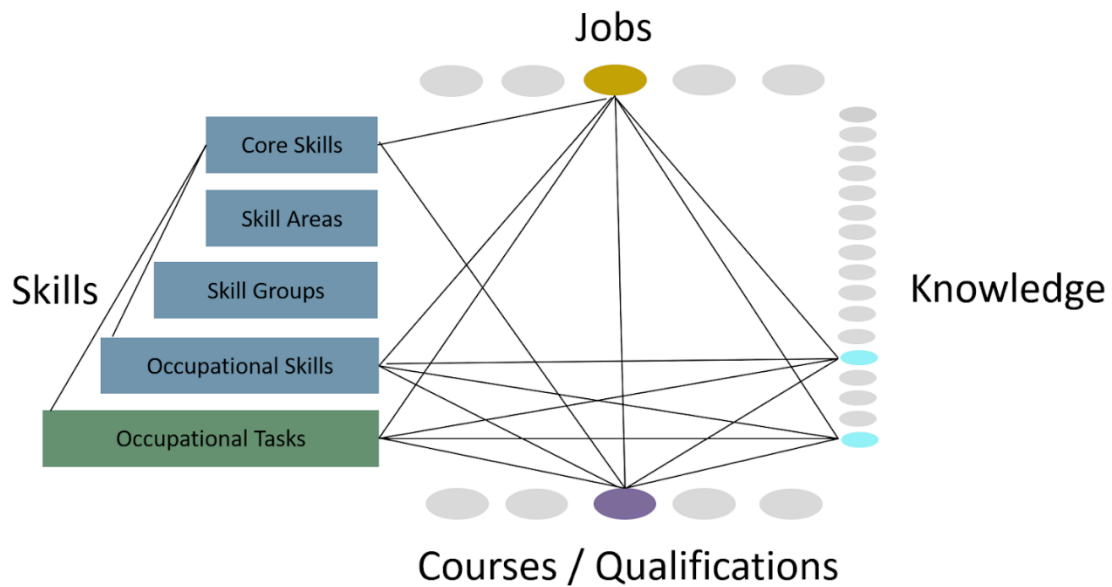
Skills will also be classified against the following subcategories:

- Green skills
- STEM skills
- Digital skills
- Emerging skills
- Industrial sectors (i.e. SIC codes)
- Maths and numeracy
- Basic skills
- SHAPE skills

Crosswalks between the UK SSC and other international classifications such as O*NET and ESCO will also be provided to facilitate international comparisons and support dataset merging and migrations.

4.6 Deliverables

Dataset Formats and Channels

To accommodate different stakeholder preferences for accessing SSC content, it will be made available via multiple channels:

- Dataset Downloads: as the preferred source format, including among tier one stakeholders, this will be the first made available and used to share prototype classification content and mappings. Files will likely be made available in both CSV and MS Excel spreadsheet formats.

- Web Pages: these will be used to give each skill and its metadata (e.g. related occupations and courses) a persistent, open, and explorable online presence. The design will draw on the layouts currently used by ESCO and the ASC as shown in Figure 9 and Figure 10 respectively. There may also be aggregated data on specific skills appended to existing dynamic skill information web pages such as the UFS local skills dashboard.
- API (Application Programming Interface): SSC data will also be made available via a new or an extension to an existing open API.

Figure 9: ESCO skills and competences example ('install insulation blocks')

Figure 10: ASC example of cluster family ('Construction')

Other tools

To encourage adoption, Phase Two engagement will also include identification and development of tools to demonstrate, simplify, and encourage use of the SSC. For example, a web-page or API endpoint to allow import of a CV and return a ranked list of matched standard skills and associated metadata. A modified version of this could also be developed for job adverts to identify the standardised skills requirements for a specific vacancy and then identify the matches and gaps against a jobseeker's current skillset.

# 5.	Use cases

The aim of a 'use case' is to demonstrate the interaction between a system or product and its potential users. This section provides some tangible examples showing how a skills classification will benefit specific user groups. We illustrate how a Standard Skills Classification can provide transformative change in the use of existing LMI for a wide range of stakeholders.

For the proposed Standard Skills Classification (SSC) linked to occupations and qualifications, a number of key user groups are identified. For each use case, a (hypothetical) example is presented to help illustrate how a skills classification will assist particular sets of users. Key challenges with the existing skills system faced by the relevant stakeholders within that user group are explored, followed by a description showing how a skills classification helps resolve those difficulties.

These three use cases are intended to be illustrative of the ways in which the SSC can be utilised by stakeholders. They are not intended to be exhaustive.

## 5.1	Individuals and careers guidance services

James is 48, lives in Newcastle and is an **experienced retail manager**:

- Been made redundant following the collapse of his employer
- Struggling to find a similar job and is open to alternative careers
- Has dependents and cannot afford to enter full-time education

The SSC would enable DWP & NCS to help James to answer:

What are my current skills?	Where are my skill gaps?
Which other jobs am I well suited to?	Which courses would best fill these gaps and enable progression?
Which skills are required for a job/career I'm interested in?	Could moving to another city improve my options?

The SSC would help James to:

- **Identify his transferable skills** – An online tool based on the SSC would allow him to upload his CV or enter a basic work history and generate a personal skills profile.
- **Evaluate his career options** – A personal skills profile could, either online or with the support of a work coach, be used to filter jobs and identify a range of

suitable career options. These could include short-term employment opportunities that, while not suitable long-term, would provide financial support during retraining or until a suitable replacement retail role became available.

- **Identify his skill gaps** – If considering a specific career change, a system comparing his skills profile with a target career could identify specific skills and/or knowledge gaps and then automatically aggregate these to develop a personal development plan.
- **Choose the best course(s) to close any gaps** – A personal development plan would allow him to check formal and informal course options and compare timing, costs and requirements. For example, he may find that there are more local opportunities in warehouse management, that his skill gaps against this role are minor (perhaps mainly related to workplace safety) and that he would be able to fill those gaps by completing relevant courses online and at minimal cost.
- **Consider opportunities if living elsewhere** – The SSC would allow James to evaluate whether a different region has more demand for his skills and whether a move could offer better future employment prospects.

Key challenges with existing provision

The last twenty years has seen an expansion in the amount of publicly funded online careers information for individuals at local, regional, and national levels provided through agencies and organisations including National Careers Service, Skills Development Scotland (SDS), Institute for Apprenticeships and Technical Education (IfATE), and Careers Wales. There is also an extensive range of not-for-profit and commercial job profiling and job matching services. This provision is created at significant expense, requiring the combination, adaptation, and maintenance of multiple datasets, some of which are expensive to procure, but are also often poorly aligned to other standard UK classifications such as SOC and SIC. This makes integration of new LMI difficult and costly. Consequently, significant resources are required to create and continually update information and data to enable employment support services to operate effectively.

In addition, the different organisations do not formally coordinate their provision of this information, and hence the content provided includes significant duplication of effort with a resulting inefficient use of resources. Different classifications are used for referencing subjects and skills (e.g. SSA and HECoS). The lack of coordination between the different organisations means that their content is not aligned and therefore cannot be easily shared or integrated into a common platform. Where existing skill classifications such as O*NET and ESCO have been utilised to help to produce content, the information sometimes can be poorly orientated and lack resonance for jobs in the UK.

The advent of scraped online vacancy information has both enhanced and complicated the LMI landscape for employment service providers. Its lack of alignment to any standard classification means that it is difficult and often prohibitively expensive to provide users real-time or near real-time labour demand information, despite the value that this information would clearly provide.

For individuals, there are currently no tools that will accurately identify their specific transferable skills, match them to suitable jobs and guide them through any career transition. This is a significant barrier to career mobility and progression.

Solutions enabled by the SSC

A Standard Skills Classification (SSC) will enable better use of LMI, including greater consistency and provision of information, more comprehensive content, and the sharing of resources. A classification with reliable mappings to other data sources would also improve the quality, connectivity, and cost-effectiveness of careers information and guidance services.

By connecting skills to jobs and qualifications, the SSC will enable more accurate and more tailored careers guidance. It will give service providers data that is ready-to-use and of higher quality than current provision, and will also simplify innovation and scaling. It would also reduce their costs. Importantly, the SSC would provide a single reliable source for careers information. In turn, this would improve the quality of tools and services available to individuals.

For individuals, the SSC would enable free tools/services to read CVs or turn a basic work history into a detailed transferable skills profile. It would help to generate more accurate job matching using a comprehensive UK-focussed database of job profiles. The SSC would also facilitate the creation of more detailed job profiles by specifying the skills required for a particular career or job vacancy. It would enable a straightforward comparison of individuals' current and required skills, and produce a detailed specification of any skill gaps (e.g. in terms of knowledge and practical experience), and the courses or qualifications which would best fill these gaps. This could include the compilation of skills development plans aligned with the most efficient combination of both formal and informal learning to close any skills gaps.

Finally, the SSC would enable the production of more granular labour market information that would allow direct comparisons of career and learning options in different geographic locations.

5.2   Employers and Local Enterprise Partnerships (LEPs)

Everywhere ECycles, an SME established in 2018, is experiencing a huge increase in demand:

- Wants to increase production by 400%
- Needs skilled machinists, mechanical and electrical engineers, IT/robotics engineers, fitters, accountants.

The SSC would enable the LEP to help the company understand:

What are the skills within our existing workforce?	How should we prioritise skills in recruitment?
What new skills do we need to add now?	How will our skills needs change as we grow?
Which existing staff should we upskill and with which courses?	Should we expand our facility here, move or open a second one?

The SSC would help the company to:

- **Analyse skills within their current workforce** – Basic employee role data (probably already held within their HR system) could be used to conduct a company-wide skills audit. This would allow management to profile the diversity, quantity and level of skills they already have at their disposal.
- **Identify a skills plan** – When planning expansion, this skills profile would enable them to quantify and prioritise skill shortages. It would also help them to systematically assess whether any employee is underutilised and may perhaps be more productive in another role. This approach could also be applied to support specific business decisions. For example, if they were to buy a larger machine to scale a particular part of their manufacturing process, which new skills will they need to programme and maintain it?
- **Adopt skills-based recruitment** – The common language of the SSC would allow them to articulate to recruiters and applicants exactly what they are seeking in terms of skills. It would also allow them to evaluate and sift candidates more objectively and efficiently.
- **Coordinate Long-Term Workforce Development** – As they plan growth in their workforce, the SSC-based company skills profile could also help them identify what other skills they will need in the longer-term as management becomes more complex and processes and policies (e.g. in HR) necessarily more formalised. By examining the underlying skillsets and ambitions of existing staff, this would also help them decide whether these would be better to develop in-house or acquire via recruitment of new staff.

- **Inform Strategic Decisions** – Fundamental business decisions often have a skills element that SSC-based LMI could help them to improve. For example, should they expand on the same site or will regional differences in the supply of the skills they need make it easier for them to scale production elsewhere or use multiple production facilities?

Key challenges with existing provision

Identifying the skills and skill gaps within an organisation typically requires specialist consultancy and often custom-built competency frameworks that are expensive and time-consuming to implement. The increased pace of technological change requiring retraining of existing workers means that training budgets need to be allocated efficiently, while the relevant information on who needs what kind of training is imperfect at best.

Recruitment organisations frequently report shortages of skilled applicants to fill vacancies whilst applicants report being unclear about what jobs will entail, given the information in job adverts. This 'matching' problem arises in part because of the difficulty of describing skills in a common language that is easily and clearly understood by both employers and employees.

Solutions enabled by the SSC

A standardised language of skills with links to occupations and qualifications would enable semi-automated skills audits, and at much lower cost. Role progression data for long-standing employees would be supplemented by CVs for more recent recruits and the majority of the processing and analysis could be semi-automated. Language tools trained with this classification would also allow organisations to easily map this to their existing training provision and evaluate its fit with organisational needs and priorities.

A standardised classification would also help with job design and accurate job descriptions – a common request from applicants confused by jargon in job ads that are often vague about what the job involves. This would improve recruitment for employers by ensuring they hire those with the skills that they need (for replacement and for expanding their workforce), and also allow individuals to find roles better suited to their skills and career goals. There are positive long-term impacts for individuals' well-being and for the economy if people are better matched to jobs.

The SSC could also help businesses to see the value in training their workforces to meet their skill demand.

5.3   Local labour market analysis and forecasting

Employer Representative Bodies (ERBs) are tasked with identifying the skills needs and priorities in drawing up their Local Skills Improvement Plans (LSIPs).

- Agencies such as SSDA, UKCES, and now UFS, have employed a narrative based around 'skills shortages' and 'skill gaps' without ever having the tools to assess or measure skills in the workforce
- There is no common language to discuss skills with individuals, employers or education/training providers

The SSC would enable ERBs to better articulate:

What are the skills within our local workforce?	Where are the gaps in local training provision?
How are our employer skill needs changing?	Can local training supply the skills required at sufficient scale?
What skills will we need to add or transition in the future?	How can employers communicate their needs to training providers?

The SSC would help the ERBs to:

- **Analyse skills within the local workforce** – A SSC linked to occupations would enable a local skills audit to be compiled based on the employment profile of the region.
- **Identify future skills needs** – based on current and future employment patterns in the region (e.g. using projections from the DfE *Working Futures* series), the ERB can identify future skills demand, and thus potential future skill shortages and gaps.
- **Engage effectively with local training providers** – A common language for skills would enable ERBs to articulate clearly to training providers the current and anticipated future skill needs in the region.

Key challenges with existing provision

There have been many attempts to quantify the concept of 'skills gap', the shortfall between the demand for various skills in the local/national economy and the supply of such skills. Without a skills classification, skills have been measured via proxy instruments such as the occupational structure of 'hard-to-fill' vacancies or from questionnaire responses provided by employers about skilled labour bottlenecks. To measure and record the current and future skill needs of employers (skills demand)

and to assess the current stock of skills amongst the workforce (skills supply) is therefore problematic. Currently the information on skills shortages is measured in broad aggregate terms. This makes for difficulties in designing course curricula that will develop the supply of specific skills to meet local and/or national skill needs.

Solutions enabled with the SSC

Current effort to measure skills demand and skills supply focusses on occupations as a proxy for skill. A standard skills classification would translate easily from occupations to job-related tasks and hence to the skills associated with such tasks, thereby providing for a more detailed and nuanced analysis of skills demand and supply than one based simply on occupations. It will also facilitate the development of specialised classifications focussing on, for example, sectoral or technology specific skills.

A skills classification would allow more targeted support and funding for local skills improvements. The links to courses and training can be used to tailor curriculum development to meet local and national skill needs. The development of a classification of skills, linked to occupations and qualifications, will facilitate a more accurate translation between occupational shortages and skill shortages.

6. Plans for construction and release

This will be a multi-stage process, primarily based on the refining, distilling, and extending of existing datasets. Each stage will generally be a series of automated routines using AI-based tools followed by manual review of exceptions (e.g. where content cannot be matched) and/or inspection of sample outputs. Quality issues or discrepancies will be resolved by refining prompts and rerunning processes or, if only affecting minimal or outlier content, manual correction and refinement. Content development may also require specialist sector guidance in complex skill areas.

The three main stages are:

(i)   The development of task information for the UK SOC 6-digit occupations (stages T1 to T6 in Figure 11),

(ii)   The identification, validation, collation, merging, and deduplication of skills information (stages S1 to S6 in Figure 12), and finally

(iii)   The identification of knowledge concepts (stages K1 to K6 in Figure 13).

The validated occupational task, skill and knowledge concepts will then be used to profile content and create mappings between jobs, courses and qualifications.

6.1 Tasks

The provisional list of inputs (subject to further validation) for the development of occupational tasks statements will be:

- O*NET Tasks (19,259)
- IfATE Duty Statements (5,150)
- UK National Careers Service Day-to-day tasks (2,037)
- UK Prospect (AGCAS) Graduate Job Profile Responsibilities (~4,000 tbc.)

Figure 11: Development of occupational tasks statements
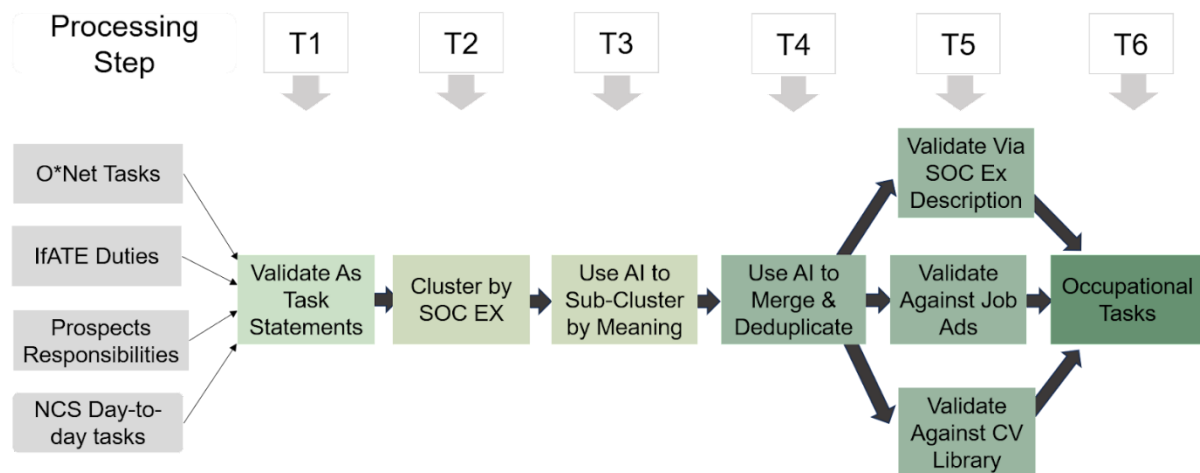
Task data processing steps:

- **T1 - Validate as occupational tasks statements** - This is where the format and content of the statements will be checked against grammatical rules (e.g. statements should start with an active verb in the present tense) and accepted, removed or modified as appropriate. For example, responsibility statements in the Prospects profile for external auditor such as "Attending meetings with auditees to develop an understanding of business processes" would be modified with the primary verb changed from the present participle to the present tense (i.e. become "*attend* meetings with auditees to develop an understanding of business processes"). In contrast, "Work towards your chartered accountancy qualification, which could include periods of study leave." would be removed as this is not a work task.
- **T2 - Cluster by SOC Ext** - The verified dataset will then be clustered by SOC Ext Sub-Unit Group (SUG)[21] using the existing mapping against O*NET, IfATE, and the National Careers Service.
- **T3 - Use AI to sub-cluster by meaning** - Within each SUG, statements with similar meaning will be grouped together.
- **T4 - Use AI to merge and deduplicate** - These groups of statements will then each be programmatically merged into one or two distinct statements. For example, two existing statements from different Software developer profiles: "Test software and diagnose and fix problems." and "Carry out trials and quality checks before release." could be merged into "Test and debug software using trialling and other quality assurance processes prior to release". They will then be compared to statements from other SUGs to avoid duplication and where appropriate, further merged and mapped to multiple SUGs. Where key role aspects are being removed or obscured by the merging

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[21] This would exclude Sub-Unit Groups for occupations Not Elsewhere Classified (n.e.c.).

process, the language algorithms would be tweaked and the process rerun. Sufficient quality of results may only be achieved after several iterations.

- **T5**
  - ○ **T5a - Validate via SOC Ext description** - The emergent set of statements will be validated against the existing SUG descriptions with any poor matches manually checked against additional sources and, if necessary, content edited or removed. All other task statements will also be compared to each SUG description to identify potentially missing tasks.
  - ○ **T5b - Validate against job ads** - Here the statement will be compared against job ads for these same SUGs. This will however require the job adverts selected to be particularly detailed as short job ads wouldn't contain detectably equivalent content, whether fundamentally aligned or not.
  - ○ **T5c - Validate against a CV library** - As a final check at this stage tasks will also be checked against a representative CV sample. Again, these will have to be detailed CVs as the content matching process would otherwise be skewed.
- **T6 - Beta Occupational Tasks** - This is the beta list that, subject to no coverage gaps being revealed by the subsequent development of occupational skills (detailed in the next section), will be shared with stakeholders for feedback.

6.2   Skills

For the identification of skills, the range of inputs will include:

- Specialist Tasks from the ASC Specialist Tasks (2,126 in total)
- Level 4 skills from ESCO (10,837)
- Detailed Work Activities (DWAs) from O*NET (2,087)
- Skill Statements from IfATE occupational/apprenticeship standards (17,061)

Figure 12: Development of occupational skills statements
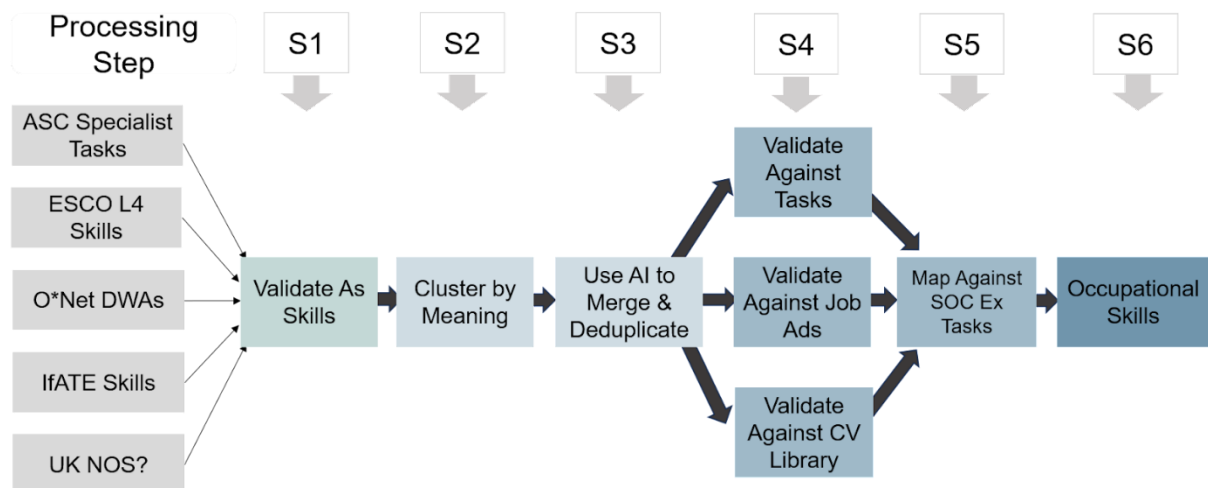
Skills data processing steps:

- **S1 - Validate as skills** - This is where the inputs will be validated in terms of both content and grammatical structure. For example, ESCO Skills such as "Prevent work accidents" or "Stand high temperatures" would be removed as they're not active concepts.
- **S2 - Cluster by meaning** - The remaining skills will then be analysed using AI and programmatically grouped with similar skills.
- **S3 - Use AI to merge and deduplicate** - Using a variety of tools, the skill groups will be merged to create a set of approximately 3,000 distinct skills.
- **S4**
  - ○ **S4a - Validate against tasks** - These distinct skills will then be programmatically matched against the list of occupational tasks validated in the previous step. Any tasks that are not mapped to any skills would indicate a potential gap in the skills classification. Conversely, where a skill has too many task matches, this would indicate that the skill defined may be too broad. Pairs of skills that are repeatedly matched against the same tasks may be duplicates. Through an iterative review and editing process, any structural content issues like this would be resolved.
  - ○ **S4b - Validate against job ads** - Here the skills will be programmatically mapped against a recent set of job adverts that align to the SOC Ext Subunit Groups (SUGs). Again, where an advert has no matches, it may indicate a classification gap or that some skills are insufficiently distinct. This validation step is subject to the limitation that large numbers of vacancies are not advertised, and so alternative means of validation would be used for these exceptions (e.g. freelance creative industry technicians such as film-crew specialists). This would

probably involve additional collaboration with professional bodies in the relevant sectors.

- ○ **S4c - Validate against CV library** - As an extra step the skills will be mapped against a sample of CVs with a representative spread of SOC SUGs. Gaps and any other irregularities in the mapping would be investigated and corrected.
- **S5 - Map against Occupation tasks** - Once the skills were validated, they will then be mapped against the Occupational task statements validated previously.
- **S6 - Beta Occupational Skills** - The validated list of skills and provisional mapping to SUGs will then be shared with stakeholders.

6.3 Knowledge

For the identification of occupational knowledge concepts, the inputs will include:

- O*NET - Knowledge, Tools Used & Technology Skills (29,960)
- ESCO Knowledge (3,050 in v1.1[22])
- HECoS - Higher Education Coding of Subjects (1,090)
- LDCSC - Learn Direct Classification of Subject Codes (4,425)
- Stack Exchange Topic Tags (c. 38,000)
- Wikipedia Article Titles (c. 12,000)
- Supplementary Sources (e.g. LinkedIn[23])

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[22] The release of ESCO v1.2 is imminent and the knowledge part of the classification is expected to be extended.

[23] Inclusion of these is subject to further research and where content is not shared using an open-licence, discussion with the rights holder.

Figure 13: Identification and validation of occupational knowledge concepts
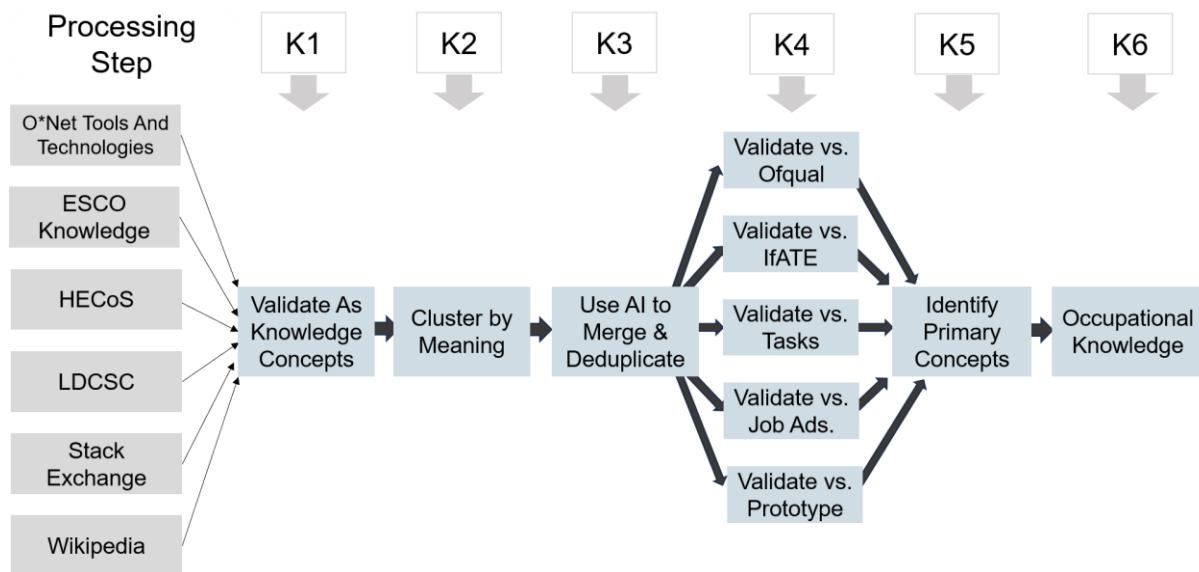
Knowledge data processing steps:

- **K1 - Validate as knowledge concepts** - This is where the input content will be validated as having a substantial and discrete knowledge base. These are concepts and techniques that can be learned and broadly applied, rather than abstract or marginal niches or innate behaviours and abilities. For example, the programming language Cython is an extension of Python and would be identified as a related but distinct concept[24] whereas Python Version 3 would not. as versioning is more a technical facet.
- **K2 - Cluster by meaning** - The validated concepts will then be analysed using AI and programmatically grouped with similar concepts across the input classifications. For example, the ESCO concept 'Python (computer programming)' being grouped with the Wikipedia article, 'Python (programming language)'.
- **K3 - Use AI to merge and deduplicate** - Using a variety of AI processes, the clusters will be merged to generate a directory of discrete knowledge concepts.
- **K4 - Validate Coverage** - These distinct concepts will then be programmatically matched against various content types to verify relevance and coverage[25]. Any components (e.g. IfATE knowledge statements or job ads) that do not map to any knowledge concepts would indicate a potential gap in the knowledge classification. Conversely, where components consistently share the same matched components, this would indicate that

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[24] The parameters for discrete knowledge concepts are not yet finalised and would be based on further prototyping to identify the optimal level of specificity.

[25] The final content set would be decided following additional research and process development.

they are not sufficiently discrete. Finally, where there is no evidence of a concept being referred to, this may indicate that it is overly abstract or needs to be redefined to enable detection.
- K4a - Validate against IfATE knowledge statements
- K4b - Validate against the 'Ofqual Register' (RQF and SCQF)
- K4c - Validate against occupational tasks
- K4d - Validate against job ads
- K4e - Validate current prototype directory

- **K5 – Identify primary concepts labels** - Once the knowledge concepts were validated, they will then be associated with a primary label (i.e. how should they be principally referred to within the SSC to be clear and avoid confusion with others).
- **K6 - Beta Occupational Knowledge** - The validated directory of knowledge concepts will then be shared with stakeholders for feedback.

6.4   Grouping and Mapping

The aggregated skill types (i.e. levels 1, 2 & 3) will be generated by clustering the skills at the level below (e.g. occupational skills clustered by functional similarity to create 'skill groups') identified at stage S6. These aggregated skill components will also be checked and mapped to the equivalent levels in O*NET, ESCO, and ASC to verify coverage and alignment.

The mapping of concepts as specified in section 4.5 will primarily involve an LLM/GPT inference function to identify and quantify the relationships between concepts. These will be checked using a mix of comparative validation (e.g. running the same or similar functions against different LLMs and checking for differences in output) and any samples and/or discrepancies being manually inspected and corrected where appropriate.

6.5   Piloting and user testing

While a wide range of organisations will be invited to feedback on prototype content, a subset will be invited to collaborate on specific implementation pilots. These will be projects designed to demonstrate and validate usage of the content to achieve particular outcomes or serve particular user-groups. The pilot partners are not yet finalised, but the target domains are:

- Engineering (e.g. Enginuity)
- Healthcare
- Workforce foresighting
- LEPs.

7. Plans for maintenance and updating

To remain fit-for-purpose, the SSC will require ongoing monitoring and maintenance.

7.1 Continuous content improvement

This will be required to reflect changes in:

- The UK labour market: Occupations emerge and evolve meaning that skill requirements are dynamic.
- Education and Training: New knowledge, technologies and teaching methods mean that course curricula and qualification criteria need to be kept up to date
- Terminology: Language used to refer to occupations, skills and technologies is not set and, especially if emerging, frequently become better known by different names that need to be recognised for a classification to stay current.

Identifying and validating skill updates

This will require collection, categorisation and analysis of several information sources likely including:

- Jobs vacancy data;
- Workforce foresighting activities (e.g. the challenge-led programmes run by Innovate UK's Workforce Foresighting Hub);
- Employer forums and associations (e.g. IfATE trailblazer panels);
- Public community forums (e.g. Stack Exchange and Discord);
- Patent filings.

Suggested additions, revisions and corrections will also be invited by existing users with all amendments under consideration being visible to:

- Prevent duplicate submissions;
- Allow users to adopt provisional content prior to formal approval.

Identifying and Archiving/Removing Redundant content

This process will be more nuanced as, even if skills become obsolete, they can remain transferable and therefore of value in personal development planning. A separate strategy for withdrawing legacy skills, tasks and occupational profiles will therefore be consulted on as part of the Phase Two planning process.

7.2 Governance and ongoing responsibilities

This will serve several functions but primarily:

- Provide a mechanism through which stakeholders can discuss future developments;
- Approve requested changes or additions to the classification;
- Coordinate efforts to drive and maintain adoption;
- Identify and evaluate potential revisions to the overall scope and features of the classification.

Appendices

Appendix A   Stakeholder groupings and engagement

A.1   Stakeholder Groupings

The 209 surveyed organisations were allocated to one of the seven following groups:

1. Education and Qualification providers
    Organisations setting standards and regulating educational/training qualifications.

2. Employers and representative bodies
    Major employers, employer representative organisations.

3. Employment Service designers and providers
    Careers Services, sector specific carers guidance organisations.

4. Policy users
    Government Departments, Arm's Length Bodies.

5. Local and regional skills bodies
    Local Enterprise Partnerships and Mayoral Combined Authorities.

6. Occupational standards/skills data providers
    Bodies setting standards and/or providing information on specific skills.

7. Taxonomy providers
    Organisations providing skills information within a structured framework.

A.2 Stakeholder Grouping Engagement

Table A 2: Stakeholder Groupings

Respondent group:	No. of survey respondents	Number interviewed
Education and qualification providers	8	3
Employers and representative bodies	30	4
Employment service designers and providers	10	2
Local and regional skills bodies*	41	-
Occupational Standards/skills data providers	4	2
Policy users	12	2
Taxonomy providers	4	3
Total	**109**	**17**

*A number of local and regional skill bodies would be interviewed at the start of Phase Two.

Appendix B   List of stakeholder meetings

B.1   Face-to-face workshops

Three multi-participant workshops were held in London at DfE offices and Gatsby Foundation premises (Victoria) with key stakeholders, with the majority of attendees in person.

Workshop 1

Occupational Standards and Skills Data Providers
Attendees: IfATE, ONS, Gatsby, UFS

Workshop 2

Education and Qualification Providers
Attendees: Ofqual, UCAS, Gatsby, UFS

Workshop 3

Public Sector Careers and Employment Service Providers
Attendees: National Careers Service, Skills Development Scotland, Careers Wales, Gatsby, UFS

B.2   Separate 1-2-1 online meetings

A number of online 'conversations' of around one hour in duration were held with a range of organisations/stakeholders. These were semi-structured interviews based around a bespoke topic guide in each case, plus further exploration of each organisation's survey responses:

Meetings held July – September 2023

Enginuity

Skills Builder

NOS (National Occupational Standards)

Jisc/HESA (Higher Education Statistics Agency)

Gatsby Foundation

UFS (Unit for Future Skills, DfE)

IfATE (Institute for Apprenticeships and Technical Education)

Ofqual (Office of Qualifications and Examinations)

JSA (Jobs and Skills Australia)

SDS (Skills Development Scotland)

ONS (Office for National Statistics)

National Careers Service

DWP (Department for Work and Pensions)

Discussions are still ongoing with NHS Digital Academy and SkillsFuture Singapore.

Appendix C   Detailed survey responses

Table C 1: Current use of skills information by type of responding organisation

Type of use of skills information	Current use of skills information (%) by:						
	Education and Qualification providers	Employers and representative bodies	Employment service designers	Local and regional skills bodies	Occupational standards/ skills data providers	Policy users	Taxonomy providers
Analysing skills supply and/or demand	57	81	80	98	100	100	100
Analysing skills within an organisation (e.g. workforce planning and training needs)	57	77	40	60	50	36	50
Creating labour market information	43	69	50	85	25	73	50
Developing career or occupational profiles	57	65	80	53	75	55	75
Developing qualifications, training courses or educational courses	57	62	60	30	25	18	25
Developing public policy	43	58	30	70	25	73	75
Developing skills taxonomies or competency frameworks	71	58	40	30	75	36	100
Helping individuals to identify courses and/or employment opportunities.	57	58	80	65	50	36	50
Identifying and forecasting future skills	71	65	70	95	50	73	100
Recruitment	57	42	20	45	0	27	50
Other	43	15	10	8	0	9	25
Total (N)	**(7)**	**(26)**	**(10)**	**(40)**	**(4)**	**(11)**	**(4)**

Note: A small number of responding organisations, mainly 'Employers and representative bodies', started but failed to complete the survey. Hence the number of organisations tabulated above is slightly less than the overall number of respondents shown in Table A 2.

Table C 2: Features of a UK Skills Classification deemed essential by type of responding organisation

Feature of a skills classification	% rating each feature of a skills classification as essential by:						
	Education and Qualification providers	Employers and representative bodies	Employment service designers	Local and regional skills bodies	Occupational standards/ skills data providers	Policy users	Taxonomy providers
Short skill name	50	47	70	56	25	27	100
Detailed skill description	50	60	60	63	100	64	100
Alternative name	25	10	20	29	50	9	50
Pre-requisite skills/knowledge	25	50	30	51	75	18	25
Multiple levels within taxonomy	50	40	50	46	100	64	25
Measure of complexity	25	33	20	17	25	18	25
Skills/ knowledge categorised separately	50	27	50	22	75	18	100
Map of skill to occupations	25	47	90	61	50	82	50
Map of skills to sectors	13	47	60	51	-	46	-
Map of skills to courses/ quals	25	50	70	66	75	55	25
Map to local geography	13	23	40	37	-	18	-
Outline of how to acquire skill	-	23	20	34	-	-	-
Clear governance & revision process	38	43	60	37	100	36	25

Table C 3: Current skills information sources by type of responding organisation

Sources of skills information	% stating they have extensive or some current use of skills information source by:						
	Education and Qualification providers	Employers and representative bodies	Employment service designers	Local and regional skills bodies	Occupational standards/ skills data providers	Policy users	Taxonomy providers
O*NET	25	13	70	15	100	27	75
ESCO	25	10	10	7	75	18	75
IfATE	63	53	40	78	50	36	75
UK National Careers Service	38	20	40	59	25	9	25
UK NOS	50	43	30	54	25	18	75
Lightcast, etc.	13	10	60	76	75	64	75
Australian Skills Classification	-	-	-	-	-	9	25
Singapore Skills Framework	-	-	-	2	-	-	-
LMI for All	25	13	30	29	25	36	25
NESTA skills taxonomy	13	13	-	7	25	-	25
Skills Builder	13	20	40	24	25	-	50
LinkedIn Skills	13	7	-	20	-	-	-

Table C 4: Perceived benefits from a UK Skills Classification by type of responding organisation

Benefit from:	% stating that a Standard Skills Classification is likely or highly likely to help their organisation by:						
	Education and Qualification providers	Employers and representative bodies	Employment service designers	Local and regional skills bodies	Occupational standards/ skills data providers	Policy users	Taxonomy providers
Improved services from suppliers	38	37	20	49		27	50
Improved quality of provided services	38	47	50	51	50	55	25
Improved quality and reach of recruitment	25	30	10	20			25
Improved training/mgt. practices	25	43	40	51		9	25
Improved sharing of data	50	70	70	68	50	64	100
Facilitating innovation	50	57	60	66	50	64	50
Reducing effort of maintaining a skills framework	25	47	30	51	50	27	25
Reducing costs	25	23	30	29			

Appendix D   Core skills

Table D1 illustrates how current core skill classification in use in the UK and elsewhere could align with the proposed UK concepts:

Table D 1: Core Skill Classifications and Proposed UK Core Skills Classification

Skills Builder: Essential Skills	Australian Skills Commission: Core Competencies	Skills Development Scotland: Metaskills	NFER Skills Imperative 2035: Essential Employment Skills	Singapore SkillsFuture: Critical Core Skills	Proposed UK Core Skills Classification
Presenting	Oral communication	Communicating	Communication	Communication	*Oral Communication*
Creativity	Initiative and innovation	Creativity	Creative thinking	Creative Thinking	*Creativity and Innovation*
Aiming High	Planning and organising		Organising, planning and prioritising work		*Planning and Organising*
Teamwork	Teamwork	Collaborating	Collaboration	Collaboration	*Working with others*
Leadership		Leading		Influence	*Leadership*
Listening					*Active Listening*
	Learning	Curiosity		Learning Agility	*Learning and Researching*
	Digital engagement		Information literacy	Digital Fluency	*Digital Literacy*
	Numeracy				*Numeracy*
	Writing				*Writing*
Staying Positive		Adapting		Adaptability	
Problem Solving	Problem solving		Problem-solving and decision making	Problem Solving	

Skills Builder: Essential Skills	Australian Skills Commission: Core Competencies	Skills Development Scotland: Metaskills	NFER Skills Imperative 2035: Essential Employment Skills	Singapore SkillsFuture: Critical Core Skills	Proposed UK Core Skills Classification
		Initiative			
	Reading				
		Sense making		Sense Making	
		Integrity			
		Focussing			
		Feeling			
				Customer Orientation	
				Self-Management	
				Transdisciplinary Thinking	
				Building Inclusivity	
				Developing People	
				Global Perspective	
				Decision Making	

Appendix E   SOC2020 skill levels, ISCED11 levels and RQF Levels

Table E 1: Correspondence between SOC2020, ISCED11 and RQL levels

Skill Levels - SOC2020 Sub-major groups		Corresponding ISCED11 levels and descriptions	Corresponding RQF 'difficulty' level and examples
Level 4	11 Corporate managers and directors	ISCED11 levels 5, 6, 7, 8: *Short cycle tertiary educational qualifications, bachelor's, master's, doctoral, post-doctoral qualifications, and equivalents*.	RQF levels 5, 6, 7, 8, 9: *Foundation degrees, bachelor's degrees, master's degrees, doctoral degrees, postdoctoral qualifications*
	21 Science, research, engineering and technology professionals		
	22 Health professionals		
	23 Teaching and other educational professionals		
	24 Business, media and public service professional		
Level 3	12 Other managers and proprietors	ISCED11 level 5: *Short cycle tertiary educational qualifications.*	RQF level 5: *Foundation degrees, DipHE, HND*
	31 Science, engineering and technology associate professionals		
	32 Health and social care associate professionals		
	33 Protective service occupations		

	34 Culture, media and sports occupations		
	35 Business and public service associate professionals		
	51 Skilled agricultural and related trades		
	52 Skilled metal, electrical and electronic trades		
	53 Skilled construction and building trades		
	54 Textiles, printing and other skilled trades		
Level 2	41 Administrative occupations	ISCED11 levels 2, 3, 4: *Lower secondary, upper secondary, post-secondary non tertiary education qualifications.*	RQF levels 2, 3, 4: *GCSE high grades, A levels, T levels, level 4 certificate/diplomas*
	42 Secretarial and related occupations		
	61 Caring personal service occupations		
	62 Leisure, travel and related personal service occupations		
	63 Community and civil enforcement occupations[1]		
	71 Sales occupations		
	72 Customer service occupations		
	81 Process, plant and machine operatives		

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	82 Transport and mobile machine drivers and operatives		
Level 1	91 Elementary trades and related occupations	ISCED11 level 1	RQF level 1 and entry levels
	92 Elementary administration and service occupations		*GCSE low grades and entry level qualifications*

Appendix F   Mappings

M1 Occupational Tasks to Occupations
Include Significance/Importance/Match Score as well as a precise numerical score also banded to: very high, high, medium.

M2 Occupational Tasks to Occupational Skills
Essential vs. optional

M3 Occupational Tasks to Knowledge (Methods)
Essential vs. optional

M4 Occupations to Occupational Skills
Include Significance/Match Score (Inferred by aggregating the task to occupation match score)

M5 Occupational Skills to Core Skills
Include % Significance/Match Score (i.e. the total match scores for an occupational skill to core skills would be 100%)

M6 Occupational Tasks to Core Skills
This would be inferred by combining mappings M2 & M5 above

M7 Occupations to Knowledge (Methods)
Include Significance/Match Score

M8 Occupations to Core Skills
Include 1-5 Proficiency Level

M9 Occupations to Related Occupations
Including a match score and also a list of shared skills, skill groups, and key knowledge areas

M10 Courses & Qualifications to Occupational Skills
Include Significance/Match Score

M11 Courses & Qualifications to Knowledge
Include Significance/Match Score

M12 Courses & Qualifications to Occupations
Include Significance/Match Score