



ESCO implementation manual

European Skills, Competences,
Qualifications and Occupations

ESCO



*European Skills,
Competences,
Qualifications
and Occupations*

This document has been prepared for the European Commission however it reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

More information on the European Union is available on the Internet (<http://www.europa.eu>).

© European Union, 2018. Images © Shutterstock.com

Reproduction is authorised provided the source is acknowledged.

For any use of photo which are not under the European Union copyright, permission must be sought directly from the copyright holder(s) indicated.

Contents

List of abbreviations	5
1. Background	6
1.1 Why mapping or replacing – ESCO in EURES	6
1.2 ESCO as a hub for the creation of mapping relations	7
1.3 Article 19 of the new EURES Regulation: Automated matching through the common IT platform	8
2. Objective and scope of the ESCO implementation manual	10
3. Technical assistance	11
4. Mapping versus replacement	12
4.1 Options for Member States	12
4.2 Mapping or replacing a classification with ESCO?	13
5. Mapping methodology	14
5.1 Set up the teams and workflow	14
5.2 Collect useful resources and documents	16
5.3 Compare the NOC/NSC and ESCO classifications	16
5.4 Establish mapping relations	17
5.4.1 Principles and recommendations	17
5.4.2 Types of mapping relations	22
5.4.3 Examples of occupation mapping cases and how to treat them	24
5.4.4 Examples of skills mapping cases and how to treat them	38
5.5 Review the mapping results	47
5.6 Publish the mapping tables	47
5.7 Maintain the mapping tables	47
5.7.1 How often should mapping tables be updated	48
6. Using ESCO as a national classification	49
6.1 Options for Member States	50
6.1.1 Building a new system using ESCO	51
6.1.2 Replacing ISCO in job matching systems with ESCO	51
6.1.3 Replacing a national classification with ESCO	52
6.2 Migration of historical data records	53
6.3 Technical implementation	53
6.3.1 Integrating ESCO by using the API	53

6.3.2	Downloading ESCO from the portal	54
6.4	Example of adoption of ESCO: Jobs Ireland Portal	54
Annex I:	Glossary of terms	57

List of abbreviations

Abbreviation	Stands for
API	Application Programme Interface
CSV	Comma-separated Values
CV	Curriculum Vitae
EEA	European Economic Area
EQF	European Qualifications Framework
ESCO	European Skills, Competences, Qualifications and Occupations
EURES	European Employment Services
ILO	International Labour Organisation
ISCO	International Standard Classification of Occupations
NOC	National Occupational Classification
NSC	National Skill Classification
PES	Public Employment Services
RDF	Resource Description Framework
TURTLE	Terse RDF Triple Language
URI	Unique Resource Identifier

1. Background

1.1 Why mapping or replacing – ESCO in EURES

The EURES Job Mobility Portal¹ and Network is a key system in enabling mobility. The portal contains more than 1.6 million job vacancies, 350,000 CVs, and 11,000 registered employers². It helps those who wish to find a job abroad and offers European employers and other stakeholders a variety of services and information covering every aspect of recruiting from other European countries.

In 2016, the Commission adopted a new EURES Regulation³ aimed at providing better job search and recruitment services across Europe and at boosting intra-EU labour mobility. Among other elements, the new rules are expected to:

- modernise the EURES system, which will become an up-to-date mobility tool that uses the latest IT technologies and is accessible by all; lead to an increase in the number of job vacancies and jobseekers' CVs available through EURES; introduce automated matching of jobseekers' skills⁴ and job openings; **adopt a 'European classification' of occupations⁵, skills⁶ and competences⁷ to support interoperability⁸.**

The EURES Regulation provides for cooperation between Member States and the Commission regarding interoperability and automated matching between job vacancies and job applications and CVs.

The use of a European classification plays an important role in this cooperation. The European classification is a list of occupations, skills and competences that will be used as a reference for the EURES common IT platform. The Regulation provides for the adoption of two Implementing Acts to formalise, for the purpose of EURES, the use of a list of occupations, skills and competences (Article 19(2)) and the mapping

¹ <https://ec.europa.eu/eures/public/es/homepage>

² Data from May 2018.

³ Regulation (EU) 2016/589 of the European Parliament and of the Council of 13 April 2016 on a European network of employment services (EURES), workers' access to mobility services and the further integration of labour markets, and amending Regulations (EU) No 492/2011 and (EU) No 1296/2013 (Text with EEA relevance).

⁴ In this document, the term 'skills' will be used to refer to skills, competences and knowledge.

⁵ Occupation is a grouping of jobs involving similar tasks and which require a similar skills set. For more information and examples, you can visit the ESCO portal: <https://ec.europa.eu/esco/portal/escopedia/Occupation>

⁶ ESCO applies the same definition of 'skill' as the European Qualifications Framework (EQF). According to this 'skill means the ability to apply knowledge and use know-how to complete tasks and solve problems'. For more information and examples, you can visit the ESCO portal: <https://ec.europa.eu/esco/portal/escopedia/Skill>

⁷ ESCO applies the same definition of 'competence' as the EQF. According to this 'competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development'. For more information and examples, you can visit the ESCO portal: <https://ec.europa.eu/esco/portal/escopedia/Competence>

⁸ Article 19 (2) of the EURES Regulation.

between national classifications and ESCO (Article 19(6)). The Commission developed ESCO for this purpose. According to article 19(3), Member States will map their national occupational classifications/national skills classifications (NOCs/NSCs) to and from the European classification. Alternatively, they can decide to adopt the European classification at national level. The Commission developed ESCO so that it can also be integrated into the EURES service platform and support the automated matching of jobseekers' skills and job openings. Using ESCO to improve semantic interoperability aims to make EURES services more relevant to the current demands of the labour market. By highlighting mismatches between CVs and vacancies, ESCO will help to identify skill gaps and learning opportunities.

Once national systems adopt ESCO version 1.0 or are mapped to it, information that is transmitted to EURES will be based on ESCO v1. Thanks to ESCO, these CVs and job vacancies will contain more standardised and detailed information covering knowledge⁹, skills and competences, and qualifications. Jobseekers all over Europe will be able to better understand job posts as they will be described more precisely, including multilingual information on the knowledge, skills and competences the employer expects. In the same manner, employers will be able to better understand job applications and the work experience, skills and competences that candidates from other European countries can bring to their business¹⁰.

For a better understanding of ESCO, Member States can consult the ESCO handbook¹¹, a document containing general information on ESCO v1, the first public release of ESCO. Its aim is to provide the reader with a general overview of the different aspects of the classification and its usage.

The scope of this document is limited to providing guidance on the technical implementation of ESCO in Member States. For more information on the objective and scope of this document, please see [Section 2: Objective and scope of the ESCO implementation manual](#).

1.2 ESCO as a hub for the creation of mapping relations

After mapping several classifications to ESCO, these classifications are also indirectly mapped to each other. Therefore, ESCO serves as a reference classification or 'hub'. The following chart illustrates how ESCO reduces the number of mappings required when exchanging data between classification systems.

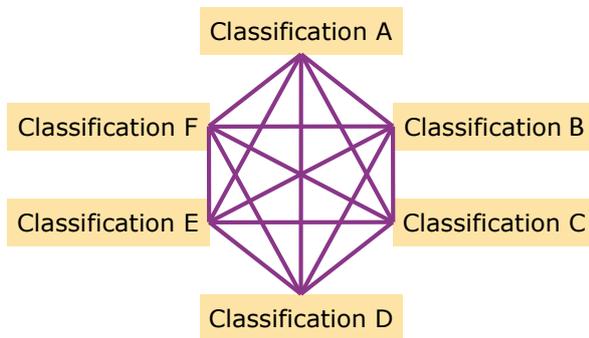
As a hub, ESCO can be used to transcode information encoded in different classifications and IT systems.

⁹ ESCO applies the same definition for 'knowledge' as the EQF. According to this, 'knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study.' For more information and examples, you can visit the ESCO portal: <https://ec.europa.eu/esco/portal/escopedia/Knowledge>

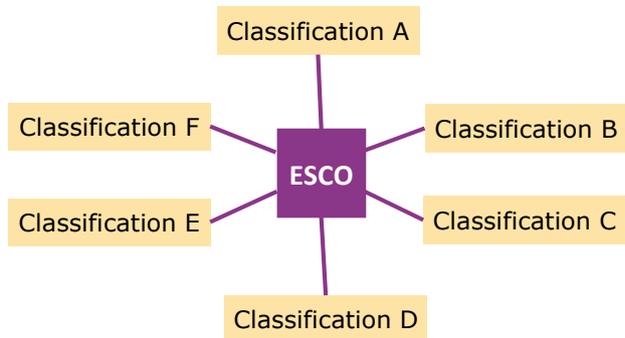
¹⁰ ESCO Handbook, p.49-50. Available at: <https://ec.europa.eu/esco/portal/document/en/0a89839c-098d-4e34-846c-54cbd5684d24>

¹¹ <https://ec.europa.eu/esco/portal/document/en/0a89839c-098d-4e34-846c-54cbd5684d24>

Mapping classifications without ESCO



Mapping classifications with ESCO



This enables employment services from all European countries to exchange job vacancies and/or CVs. The advantage of this solution is that employment services do not need to change their way of working and can maintain their own classification and IT systems. Nonetheless, they will be able to exchange data using ESCO.

Since ESCO is available in 27 languages, it will be possible to overcome the language barrier as well.

Example: Once national classification systems are mapped to ESCO, the Irish public employment service could search for an 'electrical engineer' job vacancy in the EURES database. It will be possible to find the 'Elektroingenieur' job vacancy, if the vacancy is identified with the name of the occupation in German or with the code according to the German classification system¹².

1.3 Article 19 of the new EURES Regulation: Automated matching through the common IT platform

Article 19 of the new EURES Regulation stipulates the following:

1. Member States shall cooperate with each other and with the Commission regarding interoperability between national systems and the European classification developed by the Commission. The Commission shall keep the Member States informed about the development of the European classification.
2. The Commission shall adopt and update, by means of Implementing Acts, the list of skills, competences and occupations of the European classification. Those Implementing Acts shall be adopted in accordance with the examination procedure referred to in Article 37(3). Where the committee delivers no opinion, the Commission shall not adopt the draft Implementing Act and the third subparagraph of Article 5(4) of Regulation (EU) No 182/2011 shall apply.

¹² ESCO Handbook, p.58-59. Available at: <https://ec.europa.eu/esco/portal/document/en/0a89839c-098d-4e34-846c-54cbd5684d24>

3. For the purpose of automated matching through the common IT platform, each Member State shall, without undue delay but no later than three years after the adoption of the list referred to in paragraph 2, establish an initial inventory to map its national, regional and sectoral classifications to and from that list and, following the introduction of the use of the inventory on the basis of an application made available by the European Coordination Office, regularly update the inventory to keep it updated with the evolution of recruitment services.
4. Member States may choose to replace their national classifications with the European classification, once completed, or maintain their interoperable national classification systems.
5. The Commission shall provide technical and, where possible, financial support to Member States when they establish the inventory pursuant to paragraph 3 and to the Member States which choose to replace national classifications with the European classification.
6. The Commission shall adopt, by means of Implementing Acts, the technical standards and formats necessary for the operation of the automated matching through the common IT platform using the European classification and the interoperability between national systems and the European classification. Those Implementing Acts shall be adopted in accordance with the examination procedure referred to in Article 37(3).

The table below displays an interpretation of each one of the paragraphs of Article 19. For more clarifications on Article 19 of the new EURES Regulation, Member States can consult the document on Article 19 of the EURES Regulation – Questions & Answers¹³.

Article 19 - Automated matching through the common IT platform		Actor
Art. 19(1)	The European Commission will develop a European classification to support interoperability within the framework of EURES, and Member States will cooperate with each other and the European Commission for this development. (With ESCO, the Commission services developed such a classification.)	European Commission
Art. 19(2)	The European Commission will adopt and update ESCO via Implementing Acts.	European Commission
Art. 19(3)	Each Member State shall establish an initial inventory to map its national, regional or sectoral classifications to and from the list referred to in Article 19(2). This inventory is to be seen in light of the EURES common IT platform. Member States need to include all national, regional and sectoral classifications that are necessary for operation of the common IT platform. This includes, in particular, all classifications of occupations, skills and competences that are used to encode job vacancies and	Member States

¹³ https://ec.europa.eu/esco/resources//escopedia/20180430_165945/22a41ad4-8d3f-452c-a8f1-7d7284b89775EURES_art_19_Q%26A.PDF

	the profiles or applications of candidates.	
Art. 19(4)	Member States have the option to replace their NOC and NSC ¹⁴ with ESCO (i.e. adopt ESCO).	Member States
Art. 19(5)	The European Commission will provide technical support to Member States either for mapping or adopting ESCO (see Section 3: Technical assistance).	European Commission
Art. 19(6)	The European Commission will adopt, via Implementing Acts, the technical standards and formats necessary for the operation of the mapping process through the application, i.e. mapping management platform. According to article 3 (§1) of the Implementing Act on the adoption of technical standards and formats necessary for the operation of the automated matching [...], the end goal is that Member States create and use machine readable mapping tables, i.e. transform the data in the NOC and NSC into the required data format: Simple Knowledge Organisation System (SKOS) ¹⁵ . Although the responsibility lies with Member States, the Commission services will support them, if needed.	European Commission

The implementation manual forms part of the technical support that the Commission services offer to Member States to either **map their NOCs/NSCs to and from the European classification or replace their NOCs/NSCs with ESCO** (Art. 19(5 and 6)). It is a living document and will be updated based on experiences from future mapping projects.

2. Objective and scope of the ESCO implementation manual

The objective of the ESCO implementation manual is to support Member States in the technical implementation of the EURES Regulation. The document can be used on a voluntary basis and it is a step-by-step guide for mapping NOCs and NSCs to the European classification or replacing them with the European classification. It is divided into six chapters:

Chapter one provides an overview of the background to ESCO.

Chapter two presents the objective and scope of the ESCO implementation manual.

Chapter three describes the technical assistance the Commission services will offer to Member States.

Chapter four lists the criteria Member States should take into consideration before deciding whether to map their NOCs and/or NSCs to ESCO or replace their NOCs/NSCs with ESCO.

¹⁴ In this document, the terms NOC and NSC will be used to refer to the national, regional and sectoral classifications of occupations and skills respectively.

¹⁵ This is the de facto standard used by the European Commission to display ESCO and create links between classifications.

Chapter five explains the methodology for establishing accurate mapping relations (according to Art. 19(3) of the EURES Regulation) as follows:

- Set up the teams and workflow;
- Develop supporting material;
- Map concepts: compare the NOC/NSC data model with the ESCO data model;
- Establish the mapping relations (accompanied by examples of mapping cases and how to treat them);
- Review the mapping results;
- Publish the mapping tables;
- Maintain the mapping tables.

It explains how to create mapping relations, but also what to do with them afterwards.

Chapter six introduces the process of using ESCO on a national level as NOC/NSC (according to Art. 19(4) of the EURES Regulation).

The ESCO implementation manual primarily targets the public authorities in Member States that are responsible for the development and maintenance of NOCs and NSCs.

3. Technical assistance

Article 19(5) stipulates that the Commission shall provide technical support to Member States, when they establish the inventory pursuant to Article 19(3) or when they replace their NOCs/NSCs with ESCO pursuant to Article 19(4). The Commission intends to support the Member States in numerous ways, in order to make the mapping process as cost-efficient as possible. This includes the following:

- A central European IT platform that allows Member States to create, update and manage different versions of mappings, and publish correspondence tables (mappings) – free of charge. In short, the platform serves as an enabling infrastructure to map other classifications to ESCO. It allows concepts from one classification to be manually mapped to concepts from another. It includes advanced search options, automatic mapping suggestions and a user-friendly interface.
- A user manual of the mapping management platform¹⁶ providing a guide to the platform, explaining the functionalities of the interface and including instructions on how to use it.
- An implementation manual (this document) explaining how ESCO can be implemented for the EURES Regulation, which can be used as a step-by-step guide for mapping NOCs and NSCs to ESCO or replacing them with ESCO.
- Training offers explaining the process of mapping to/from ESCO or adopting ESCO provided by a team of taxonomists and IT specialists.

¹⁶ This document will soon be available at the ESCO portal in the Escopedia:
https://ec.europa.eu/esco/portal/escopedia/Main_Page

- A central European contact point (helpdesk) to clarify difficult/ambiguous cases composed of a team of experts who reply to enquiries received by the mappers. The ESCO helpdesk is accessible via EMPL-ESCO-SECRETARIAT@ec.europa.eu

Furthermore, the Commission services together with Public Employment Services (PES) from Member States have carried out pilot projects aimed at establishing mapping relations between ESCO occupations and NOCs¹⁷, and ESCO skills and NSCs¹⁸. The results of these pilot projects are available on the ESCO portal¹⁹ and can serve as learning resources. Therefore, they also form part of the support the Commission services offer to the Member States.

4. Mapping versus replacement

4.1 Options for Member States

As previously mentioned, the EURES Regulation provides the option for Member States to either map their NOCs/NSCs to the European classification or replace them with the European classification. In the second case, depending on their needs, they can adopt:

- the full classification;
- the occupations pillar;
- the skills pillar.

The possible scenarios are summarised in the table below²⁰:

Classifications that Member States use to register information on job vacancies and CVs	ESCO implementation options
An occupational classification	Map their classification to the occupations pillar of ESCO
	Map their classification to the occupations pillar of ESCO and integrate the ESCO skills into their systems
	Replace their classification with ESCO occupations
	Replace their classification with the full ESCO classification
An occupational and a skills classification	Map their classification to ESCO
	Replace their classification with ESCO
ISCO-08	Use the ESCO occupations at national level
	Use the full ESCO classification at national level

¹⁷ https://ec.europa.eu/esco/portal/escopedia/ESCO_mapping_pilot

¹⁸ https://ec.europa.eu/esco/portal/escopedia/ESCO_skills_mapping_pilot

¹⁹ https://ec.europa.eu/esco/portal/escopedia/Mapping_to_ESCO

²⁰ In case a Member State has a skills classification without an occupational classification, their authorities should contact the ESCO helpdesk at EMPL-ESCO-SECRETARIAT@ec.europa.eu.

4.2 Mapping or replacing a classification with ESCO?

The decision of whether to map or replace a classification with ESCO depends on multiple factors. It is up to Member States to make this decision, based on their needs and expectations. Below we provide a list of criteria that might help Member States to decide whether to map their classifications to ESCO or replace them entirely.

When can it be useful for Member States to adopt ESCO directly into their systems?

- **If they have a NOC/NCS that is not widely used.** In some cases, Member States have classifications that are obsolete or poorly maintained, and are therefore not used by labour market actors. Instead of updating this classification, it might be more efficient to adopt ESCO, which is up-to-date and aims to become the de facto standard at European level.
- **If they have a NOC/NSC that does not include a lot of meta information.** Each occupation and skill concept in ESCO provides an important amount of metadata: a preferred term, non-preferred terms, hidden terms, scope notes, skills types, etc. When NOCs/NCSs do not contain this amount of information, Member States might consider adopting ESCO.
- **If they do not have a skills classification.** Most Member States do not have a skills classification and it may be more effective to adopt ESCO than to build a new classification from scratch. As explained in the previous section, they can also decide to adopt just the skills pillar, and to map their occupations to the ESCO occupations pillar.
- **If they feel that the cost of keeping their current NOC/NSC is higher than the cost of adopting ESCO.** Maintaining and updating a classification can incur significant costs. Moreover, Member States should take into account the costs related to mapping the classification to ESCO. By adopting ESCO directly into their systems, Member States can save on all these costs, as the classification is managed by the Commission and provided for free.

When can it be useful for Member States to map their classifications to ESCO?

- **If they have a mature NOC/NSC that is widely used by professionals and IT systems, and people are trained on using it.** Adopting a new classification would incur some costs (training staff, replacing the old classification in systems, etc.). In this case, mapping the NOC/NSC to ESCO could be a better option.
- **If they have a classification that is tailored to the specificities of the national labour market.** ESCO is a European classification, which might not take into account the particularities of different Member States. When a NOC/NSC is adapted to the national system and reflects the national labour market, it might be better to keep this classification and map it to ESCO.
- **If they have a working system with an important amount of historical data.** Adapting historical data for a new system might be costly and time consuming, in particular when the amount of data is very large. In this case, it might be better to map the NOC/NSC to ESCO.

- If they have a NOC/NSC that is linked to National Qualification Standards. If Member States have developed a NOC/NSC and linked it to National Qualification Standards, it is not advisable to replace this classification with ESCO, as ESCO does not establish a direct link between occupations and qualifications at national level.

5. Mapping methodology

The methodology for establishing accurate mapping relations contains the following steps:

- Set up the teams and workflow;
- Collect useful resources and documents;
- Compare the NOC/NSC and ESCO classifications;
- Establish mapping relations;
- Review the mapping relations, publish and maintain/update them.

Article 19(3) specifies that the mapping and the updating of inventories can be made on the basis of an application provided by the European Coordination Office. This application will allow Member States to:

- import classifications in order to start a new mapping project (with technical support from the Commission services);
- establish mapping tables using computer-assisted suggestions;
- revise the established mapping relations;
- update the mapping tables, when necessary, by creating new versions.

Once the classifications are imported into the mapping management platform, the mappers can establish mapping relations by:

- browsing and searching the target classification to find the concept that best matches the one in the source classification;
- receiving suggestions for related concepts (the tool will assist the mapper by providing suggestions, but it is the human who will always establish the mapping relation).

5.1 Set up the teams and workflow

Although it is the responsibility of Member States to define a mapping process that serves the needs of their mapping team and the particularities of their classification(s), the Commission services recommends establishing a team of people to create mapping relations with mapper and reviewer roles. This will ensure the quality assurance of mapping relations.

There are Member States that outsource the creation of their own national classification and their maintenance, e.g. the Austrian PES. Outsourcing the creation of mapping relations is also feasible.

The effort will depend on the number and complexity of the classifications and the amount of experience at national level with mapping classifications. Together with four PES, the Commission conducted a mapping exercise where four occupational classifications were mapped to a pilot version of ESCO²¹ (see [Section 3: Technical assistance](#)). Participants concluded that the initial mapping of occupational classifications took about 60 people days.

In addition, again together with two PES, the Commission conducted a mapping pilot of two national classifications of skills to ESCO v1. Participants (the Austrian and Swedish PES) concluded that mapping a sample of 610 ESCO skills took:

- Austria: 50 hours
- Sweden: 80 hours

This time does not include quality assurance by reviewers, only the initial creation of the mapping relations.

Member States should establish, as a starting point, the classification they know the least (i.e. ESCO), and map towards the classification they know best (i.e. their NOC and NSC). It is recommended that Member States carry out a bi-directional mapping, i.e.: from ESCO to their NOC/NSC, and from their NOC/NSC to ESCO.

Bi-directional mapping yields better results because it serves as a quality assurance mechanism. Mapping from the opposite direction provides the user with another perspective and may result in different mapping relations. Mapping in the opposite direction should start once the first direction is complete.

Bi-directional mapping is helpful, but it is equally important to ensure that individual mappings are quality assured by professionals from various backgrounds, e.g. sectoral experts, PES employees.

For the **occupations** the goal is to have mapping that works in both directions and that is complete in both directions, where each ESCO occupation is mapped to at least one occupation in the NOC and the other way around. Even in cases where there is no equivalent concept in ESCO for a NOC concept, the latter can still be mapped to the relevant ISCO unit group that serves as the broader²² occupation in ESCO.

For the **skills**, this is not the case. The goal here is to have mapping that is bi-directional but not necessarily complete. This is due to the fact that:

- the skills pillar does not aim for a complete coverage of all skills;
- a skill in ESCO does not necessarily have a broader skill;
- there is less similarity between skill classifications than there is between occupational classifications, which makes mapping skills challenging.

²¹ https://ec.europa.eu/esco/portal/escopedia/ESCO_mapping_pilot

²² In ESCO, some occupations and skills/knowledge concepts have broader-narrower relations between them. 'Broader' refers to the general occupation, the one that is one level higher and to which an occupation or skill/knowledge concept belongs while 'narrower' refers to the specific one, the one that is one level lower.

The results of a skills mapping pilot between ESCO and NSCs²³ showed that there cannot be complete mapping from one skill classification to another. There will always be skills that remain without a mapping relation.



Note: In case you encounter errors when establishing mapping relations (e.g. an occupation is missing), please send us your feedback through the ESCO helpdesk at EMPL-ESCO-SECRETARIAT@ec.europa.eu.

5.2 Collect useful resources and documents

This section lists existing material that can potentially support the mappers during the creation of mapping relations:

- Mapping between NOCs and ISCO;
- Different language versions/translations of NOCs/NSCs;
- Thesauri, dictionaries or other lists of synonyms for the language;
- Database of past mappings with ESCO (if that already exists);
- Existing relations to other classifications.

5.3 Compare the NOC/NSC and ESCO classifications

Before creating mapping relations between the concepts of two classifications, it is important to ensure a good understanding of the types of concepts that are subject to the mapping. Each involved party should:

- have the same understanding of labour market concepts (e.g. occupations, jobs, professions, skills/competences, knowledge, activities, tasks);
- be aware of the differences between their data model and the ESCO data model;
- know which concepts should be mapped (e.g. job groups, activities, terms).

In general, the following types of classifications need to be mapped to ESCO:

- Classifications that group similar jobs together and are used when registering information on job vacancies and CVs in EURES. Typically, such classifications refer to the grouping of jobs as 'occupations', 'professions', 'job titles', 'job sheets', 'job roles', 'job groups' or similar terms. These should be mapped to the occupations pillar of ESCO.
- Classifications or word lists that are used to group what a candidate, employee or jobseeker knows, can do or can take responsibility for. They are used when registering information on job vacancies or CVs/candidate profiles. Typically, such classifications or word lists refer to the concepts as 'skills', 'competences', 'knowledge', 'tasks', 'work activities', 'abilities', 'tools and technologies', 'product knowledge' or 'work context'.

²³ https://ec.europa.eu/esco/portal/escopedia/ESCO_skills_mapping_pilot

The creation of mapping relations is considered an arbitrary and subjective exercise and will be affected by:

- sectoral and societal differences among Member States;
- different understandings of skill concepts
- differences when applying context to skill concepts.

5.4 Establish mapping relations

Within the framework of the mapping process, Members States will establish mapping relations between concepts in their NOCs/NSCs and ESCO. In general terms, a concept is a thing, idea or shared understanding of something. Concepts are not language dependent.

Example: The idea or shared understanding of a person baking bread and selling it to customers is a 'concept'. Terms that are frequently used to refer to this concept are e.g. 'baker' in English or 'Bäcker/in' in German.

In ESCO, each concept is associated with one preferred term²⁴ for each ESCO language, several non-preferred terms²⁵ and related metadata for each ESCO language.

Occupations and skills in ESCO contain preferred terms and descriptions. For example:

- **Preferred term:** Analyse the artistic concept based on stage actions.
- **Description:** Analyse the artistic concept, form and structure of a live performance based on observation during rehearsals or improvisation. Create a structured base for the design process of a specific production.

5.4.1 Principles and recommendations

Principle 1: Multiple sources of information are useful

When looking into occupation concepts to find the equivalent mapping pair and define the adequate relation type, the following information should be taken into account:

- Concept information available: Preferred term, description, non-preferred terms and related metadata for both classifications;
- Broader concepts available;

²⁴ Each concept within ESCO has a designated, unique preferred name per ESCO language. It is called the preferred term and can be a single-word term or a multi-word term. For more information, you can visit the ESCO portal: https://ec.europa.eu/esco/portal/escopedia/Preferred_term_%2528PT%2529

²⁵ Non-preferred terms can be synonyms (words with similar or the same meanings), but can also be spelling variants, declensions, abbreviations, etc. For more information, you can visit the ESCO portal: https://ec.europa.eu/esco/portal/escopedia/Non-preferred_term_%2528NPT%2529

- Desk research: Same and similar occupations on job boards, published job vacancies, etc.;
- Classification characteristics;
- Agreed rules;
- Any available evidence of labour market trends.

For instance, although the preferred terms for an occupation in two classifications can be an 'exact match', it is possible that, on the basis of the description, their list of skills/competences or desk research, another relation type is applied or no mapping relation gets established (e.g. in the case of homonyms²⁶.) For example:

Classification A	Description	Relation	Classification B	Description
Conductor	They lead musical groups such as orchestras and bands during live performances or recording sessions. They organise the music and composition, coordinate the playing musicians and record the performance. Also known as music directors, they are professionals working in diverse places such as the film industry, music videos, radio stations, musical ensembles or schools.	Exact match	Conductor	Music conductors, or maestros, who lead orchestras and help the musicians to keep pace with the tempo, while delivering their interpretation of the musical score.
Conductor	They lead musical groups such as orchestras and bands during live performances or recording sessions. They organise the music and composition, coordinate the playing musicians and record the performance. Also known as music directors, they are professionals working in diverse places such as the film industry, music videos, radio stations, musical ensembles or schools.	No match	Conductor	A conductor is an occupation in the transport sector, mainly related to train and bus operation.

²⁶ Homonyms are words that sound or are spelled alike, but have different meanings:
<https://en.wikipedia.org/wiki/Homonym>

Recommendation 1: Take into consideration various metadata (e.g. descriptions, and relations, skills related to the occupation) in order to find the equivalent mapping pair and define the adequate relation type. Do not rely solely on the preferred terms.

Principle 2: The use of the International Standard Classification of Occupations (ISCO-08)

ISCO-08, developed by the International Labour Organisation (ILO), provides a system for classifying and aggregating occupational information obtained by means of statistical censuses and surveys, as well as from administrative records. It is a four-level hierarchically-structured classification that allows occupations to be classified into 436 unit groups.

Each ESCO occupation is mapped to one ISCO-08 unit group. Therefore, the two classifications are interoperable. This allows ESCO to build on the international acceptance of ISCO. This is particularly important because most national occupational classifications are currently mapped to ISCO-08. This will also make it easier to map them to ESCO²⁷.

Typically, both ESCO and NOCs in Europe are mapped to ISCO-08. Therefore, when looking for an ESCO occupation that matches a NOC occupation, it is best to start by looking at the ESCO occupations that are mapped to the same ISCO-08 unit group (the fourth level of ISCO) as the NOC occupation in question.

However, there may be cases where the matching occupations are mapped to different ISCO unit groups. For example:

ESCO occupation	ISCO-08 unit group
Night auditor	4226 Receptionists (general)

NOC occupation	ISCO-08 unit group
Night auditor	4224 Hotel receptionists

The case above could suggest that there is a need to review the ISCO mapping of the ESCO occupation or the NOC occupation. Member States should report cases of this type to the ESCO team for further investigation. However, while the common ISCO-08 mapping is a convenient way to find the right match in most cases, the accuracy of the mapping between ESCO occupations and NOC occupations is the most important goal.

Recommendation 2: Use ISCO-08 as a common denominator to identify equivalent occupations.

²⁷ ESCO handbook, p.29. Available at: <https://ec.europa.eu/esco/portal/document/en/0a89839c-098d-4e34-846c-54cbd5684d24>

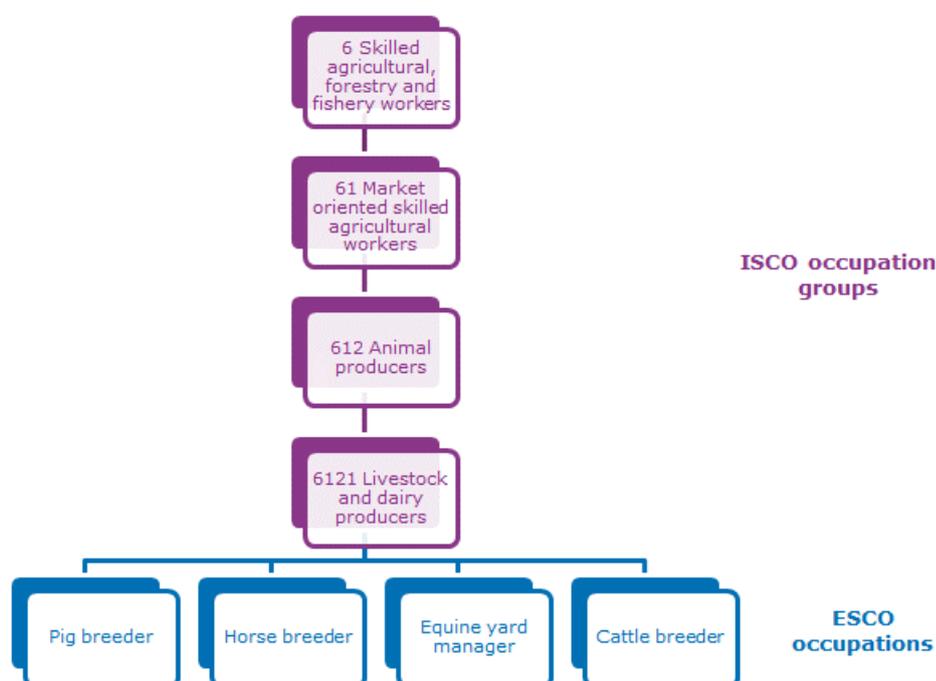


Note: The ESCO – ISCO mappings have been reviewed by an expert recommended by the ILO.

Principle 3: The hierarchical structure of ESCO occupations

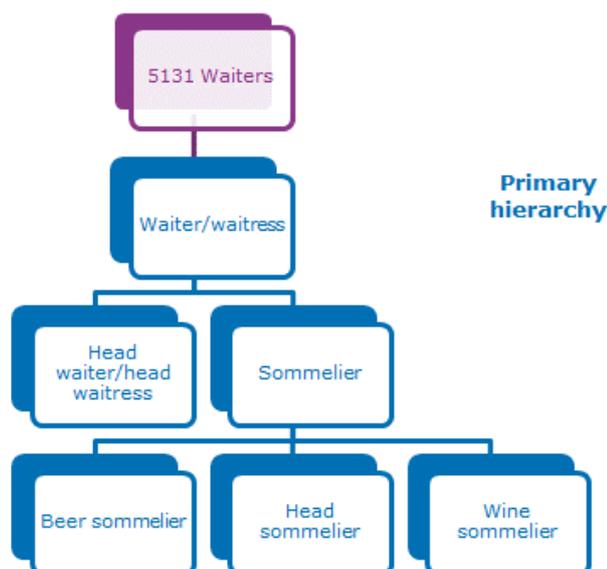
Occupations in ESCO are structured through their mapping to ISCO-08. The ESCO occupations and their ISCO-08 hierarchy make up the ESCO occupations pillar.

ISCO-08 provides the top four levels, while ESCO occupations provide the fifth and lower levels. Each ESCO occupation is assigned to one ISCO-08 unit group (even if they are not directly related to it, e.g. if they are at level six or seven)²⁸.



In the example below, Member States can map a concept in their classification to sommelier or wine sommelier, depending on how detailed their classification system is.

²⁸ ESCO handbook, p.17. Available at: <https://ec.europa.eu/esco/portal/document/en/0a89839c-098d-4e34-846c-54cbd5684d24>



Recommendation 3: Map to the most relevant level of the ESCO tree. It may not be the lowest one, but should be the one that best matches the scope of the corresponding NOC occupation.

Principle 4: Multilingualism

The European Commission has made ESCO available in 27 languages (all EU official languages, Icelandic, Norwegian and Arabic), in order to facilitate increased international transparency and cooperation in the area of skills and qualifications. ESCO bridges language barriers by providing terms for each concept in all these languages.

ESCO terms were first formulated in English, which is the ESCO reference language. Once the terms were formulated in English, terminologists and market experts ensured that the formulated terms properly reflected the meaning of the concept as captured by the description and the scope note (if available). A similar process for term formulation and validation took place for all ESCO languages other than English.

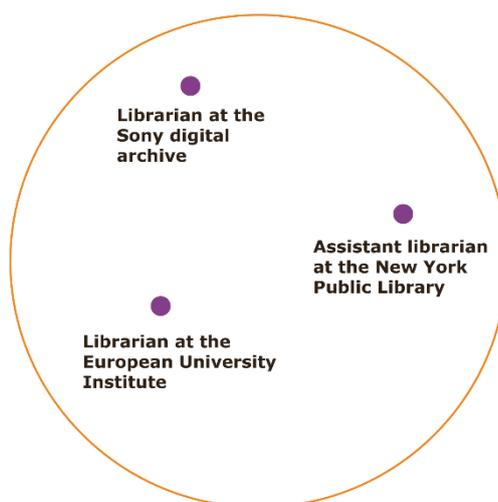
The multilingualism aspect of ESCO is beneficial for Member States. In fact, they can view the ESCO content in their own language when creating mapping relations. Additionally, they can switch to different languages to support a better understanding of the concepts if needed.

Recommendation 4: When mapping, display ESCO in your own language and use the English version (or another language) as an extra.

5.4.2 Types of mapping relations

When establishing mapping relations, it is important to analyse the scope of the concepts that we want to map. This analysis should be based on a good understanding of the concepts described in ESCO.

An occupation is a 'set of jobs whose main tasks and duties are characterised by a high degree of similarity'²⁹. While ESCO does not describe jobs, it accepts the definition of jobs as a 'set of tasks and duties carried out, or meant to be carried out, by one person for a particular employer, including self-employment'³⁰. For example:



The occupations in the circle shown above are likely to perform similar tasks, which in turn require similar sets of skills.

With regard to skill concepts, creating mapping tables is more straightforward because skills in ESCO are 'atomised': they use action verbs to describe an individual action a worker is able to do or a single knowledge aspect the worker knows.

Based on this understanding, experts can choose among the following four types of relations.

Relation type	Explanation
Exact match	<p>A concept in a NOC or NSC covers the same scope as a concept in ESCO v1 and vice versa.</p> <p>Occupations</p> <ul style="list-style-type: none"> Example: Autopsist (NOC) IS AN EXACT MATCH WITH coroner (ESCO);

²⁹ Source: International Labour Organisation, ILO, International Standard Classification of Occupations (ISCO-08) – Conceptual Framework

³⁰ Ibid.

	<ul style="list-style-type: none"> • Example: Bakery worker (NOC) IS AN EXACT MATCH WITH baking operator (ESCO). <p>Skills/competences and knowledge</p> <ul style="list-style-type: none"> • Example: Frustrationstoleranz = frustration tolerance (NSC) IS AN EXACT MATCH WITH mit Frustration umgehen = deal with frustration (ESCO); • Example: Reinlichkeit = cleanliness (NSC) IS AN EXACT MATCH WITH auf Hygiene achten = pay attention to hygiene.
More specific than	<p>A concept in a NOC or NSC is more specific than a concept in ESCO v1, as it covers only a fraction of its scope.</p> <p>Occupations</p> <ul style="list-style-type: none"> • Example: Authorised translator (NOC) IS MORE SPECIFIC THAN translator (ESCO); • Example: Bridge engineer (NOC) IS MORE SPECIFIC THAN construction engineer (ESCO). <p>Skills/competences and knowledge</p> <ul style="list-style-type: none"> • Example: Interkulturelle Kompetenz = intercultural competence (NSC) IS MORE SPECIFIC THAN interkulturelles Bewusstsein zeigen = show intercultural awareness (ESCO); • Example: Fachberatung = expert advice (NSC) IS MORE SPECIFIC THAN Beratung = consultation (ESCO).
More general than	<p>A concept in a NOC or NSC is more general than a concept in ESCO v1, as it covers its full scope and more (e.g. additional occupations).</p> <p>Occupations</p> <ul style="list-style-type: none"> • Example: Auditor (NOC) IS MORE GENERAL THAN financial auditor (ESCO); • Example: bag maker (NOC) IS MORE GENERAL THAN paper bag machine operator (ESCO). <p>Skills/competences and knowledge</p> <ul style="list-style-type: none"> • Example: Perückenherstellung = wig production (NSC) IS MORE GENERAL THAN Perücken färben = colour wigs, Perücken reparieren = repair wigs (ESCO); • Example: Qualitätsbewusstsein = quality awareness (NSC) IS MORE GENERAL THAN Qualität von Schuhwerk = footwear quality.
Close match	<p>This is used when neither of the two occupation concepts covers all the jobs that are in the other occupation concept, but they overlap</p>

in part (i.e. many jobs fall under both occupation concepts).

This case may occur when a classification is based on a dimension or perspective that is not reflected in the other classification (e.g. one is based on a product and the other on a manufacturing process/technique). In other words, a concept can be identified that is very similar, but not identical.

Solution: Establish one or more 'close matches' and map to the relevant ISCO unit group.

Occupations

- **Example 1:**

- Careers teacher (NOC) IS A CLOSE MATCH WITH educational counsellor (ESCO);
- Careers teacher (NOC) IS A CLOSE MATCH WITH career guidance advisor (ESCO);
- Careers teacher (NOC) IS MORE SPECIFIC THAN 2359 Teaching professionals not elsewhere classified (ISCO);
- Careers teacher (NOC) IS MORE SPECIFIC THAN 2423 Personnel and careers professionals (ISCO).

- **Example 2:**

- Country analyst (NOC) IS A CLOSE MATCH WITH economist (ESCO);
- Country analyst (NOC) IS MORE SPECIFIC THAN 2631 Economists (ISCO).

Skills/competences and knowledge

- **Example:** Kreativität = creativity (NSC) IS A CLOSE MATCH WITH kreativ denken = think creatively, kreative Ideen entwickeln = develop creative ideas (ESCO);
- **Example:** Urteilsfähigkeit = judgement ability (NSC) IS A CLOSE MATCH WITH Informationen bewerten = rate information (ESCO).

These relation types are further explained below, with examples.

5.4.3 Examples of occupation mapping cases and how to treat them

'Establish mapping relations between occupations' means that experts will create relations between occupations in ESCO v1 and equivalent types of concepts in their NOCs (e.g. professions, job titles). The following section includes a sample of difficult mapping cases and provides guidance on how to handle them. The cases are hypothetical, based on mapping occupation concepts between a classification 'NOC X' and ESCO v1.

5.4.3.1 An occupation in one classification has multiple mapping relations (of different types) to occupations in the other classification

Case description: Due to differences in the granularity levels among classifications, it is common to encounter occupations in the NOCs that have more than one mapping relation to occupations in ESCO (and vice-versa). The relation types can be the same or different ones. Establishing multiple mapping relations will create further 'noise'³¹; therefore, it should be avoided

Case 1: Multiple 'exact match' mapping relations

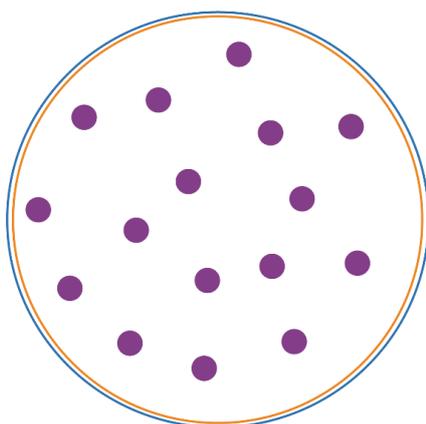
This means that an occupation in ESCO v1 has exactly the same meaning as two or more occupations in NOC X. Establishing such mapping relations implies that the occupations in NOC X are duplicates since they are all equal to the same concept in ESCO. ESCO v1 should not contain duplicate concepts, therefore, the rule cannot be reversed (i.e. an occupation in NOC X cannot mean the same as more than one occupation in ESCO v1).



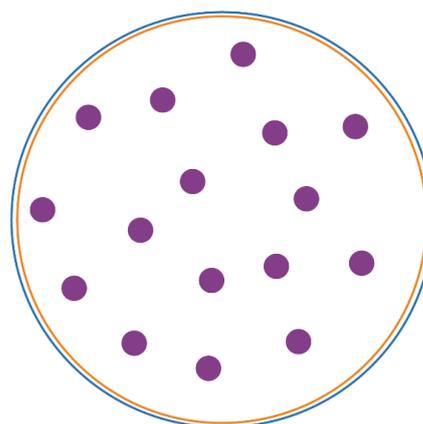
Note: In case you come across a situation where one concept in NOC X should be mapped as an 'exact match' to multiple ESCO concepts, please contact the ESCO helpdesk at EMPL-ESCO-SECRETARIAT@ec.europa.eu.

Example

NOC X	Mapping type relation	ESCO v1
Advertising assistant	Exact match	Advertising assistant
Advertising secretary	Exact match	Advertising assistant



Advertising assistant
Advertising assistant



Advertising assistant
Advertising secretary

³¹ In the context of EURES, 'noise' is used to refer to the decrease of effectiveness stemming from the exchange of CVs and job vacancies. For instance, using the mapping tables to match CVs and job vacancies tagged with different classifications would return a high number of results that would not be relevant for the users (employers and jobseekers). Likewise, part of the information would get lost. The results of the skills mapping pilot indicate that although the transformation of job vacancies and CVs using the mapping tables introduces 'noise', the usability of the documents is retained.

Explanation of the example: An advertising assistant in ESCO v1 (in blue in the image above) means the same as an advertising assistant and an advertising secretary in the NOC X (in orange in the image above).



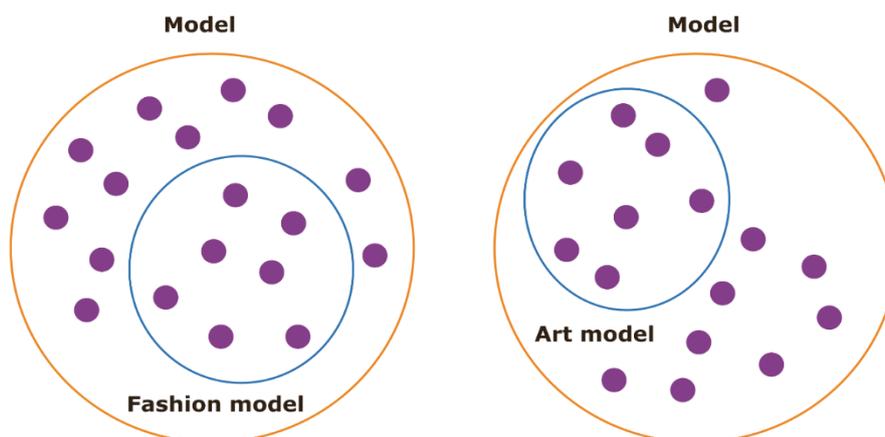
Note: This conclusion should only be drawn after looking into the metadata of the concepts (e.g. description, competences) and not be based on the preferred term alone.

Case 2: Multiple 'more general than' mapping relations

This means that an occupation in one classification has several specialised occupations in the other one.

Example

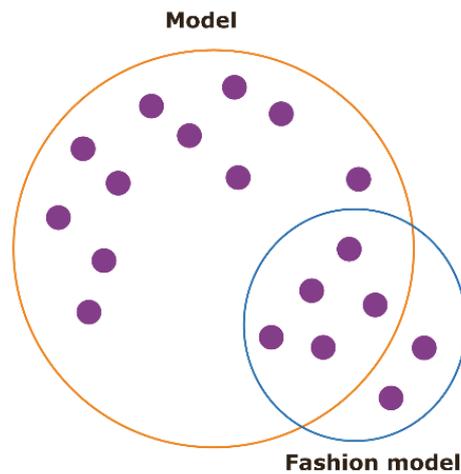
NOC X	Mapping type relation	ESCO v1
Model	More general than	Fashion model
Model	More general than	Art model



Explanation of the example: A fashion model and an art model are instances of models.

It is important to notice that all of the jobs (or most of them) within the scope of the fashion model and the art model are also within the scope of the model. This is a necessary condition to map the model as 'more general than' the other two occupations.

As shown below, if ESCO described the fashion model role as including jobs that are not about modelling (e.g. jobs about promoting fashion), the relation could not be 'more general than' and would instead be a 'close match' (see [Section 5.4.3.2: Criteria and rules for establishing a 'close match'](#) for further information).



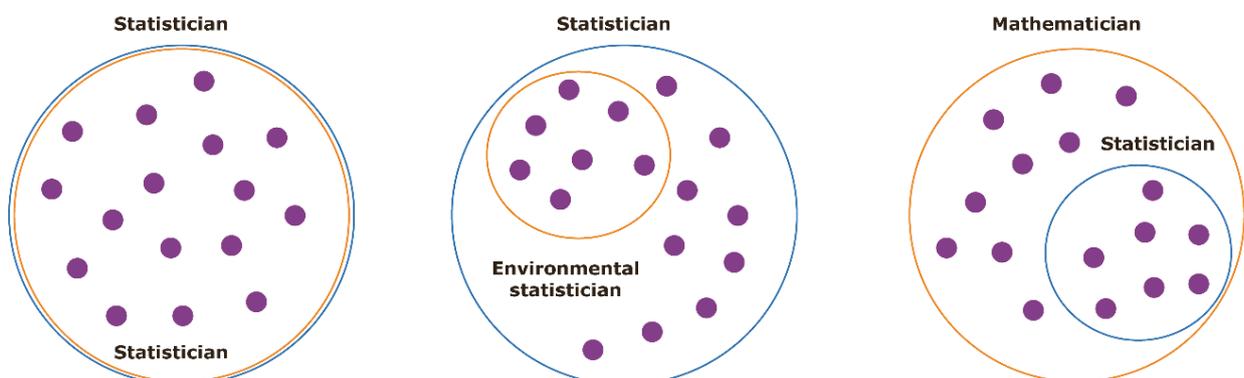
Case 3: Multiple 'exact match', 'more general than' and 'more specific than' mapping relations

This means that an occupation in one classification can be:

- 'more general than' more than one occupation in the other classification;
- 'more general than' one occupation and an 'exact match' to another one in the same classification;
- 'more general than' one occupation, an 'exact match' to another one and 'more specific than' another occupation within the same classification.

Example 1

ESCO v1	Mapping type relation	NOC X
Statistician	Exact match to	Statistician
Statistician	More general than	Environmental statistician
Statistician	More specific than	Mathematicians, actuaries and statisticians



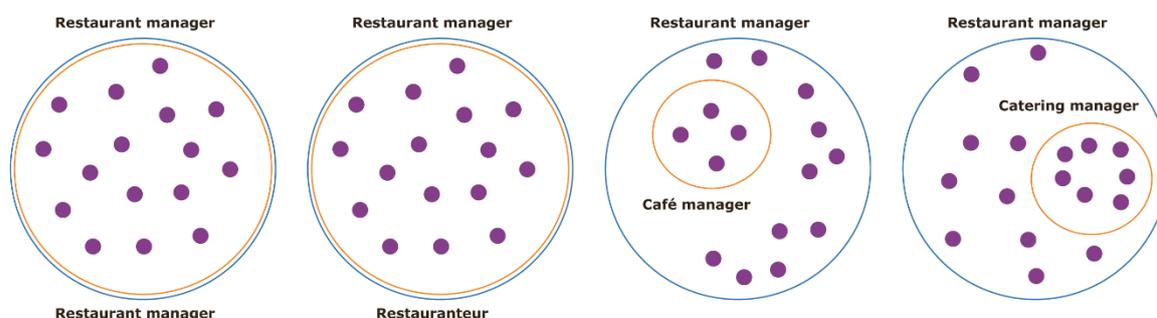
Explanation of the example: A statistician in ESCO v1 is an exact match to an occupation with exactly the same scope in NOC X.

The ESCO statistician occupation also has a 'more general than' relation type to the environmental statistician occupation in NOC X because it covers all jobs under this occupation and more.

Finally, the ESCO statistician occupation has a 'more specific than' relation type to the mathematician occupation in NOC X because it covers only a subset of the jobs covered under this occupation.

Example 2

ESCO v1	Mapping type relation	NOC X
Restaurant manager	Exact match to	Restaurant manager
Restaurant manager	Exact match to	Restaurateur
Restaurant manager	More general than	Café manager
Restaurant manager	More general than	Catering manager



Explanation of the example: A restaurant manager in ESCO v1 is an exact match to two occupations with exactly the same scope in NOC X.

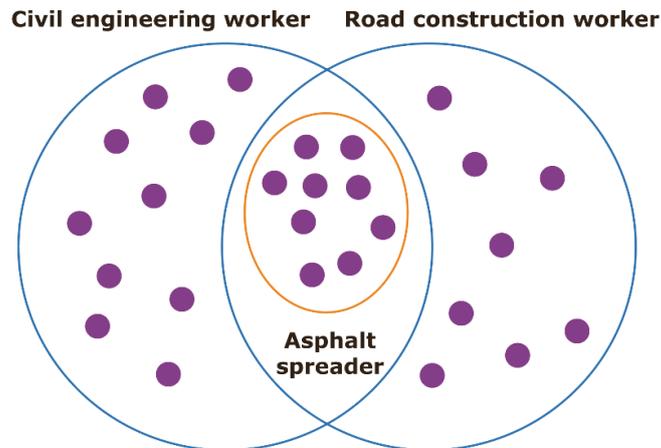
This occupation also has a 'more general than' relation type to the café manager and catering manager occupations in NOC X because it covers all jobs under these occupations and more.

Case 4: Multiple 'more specific than' mapping relations

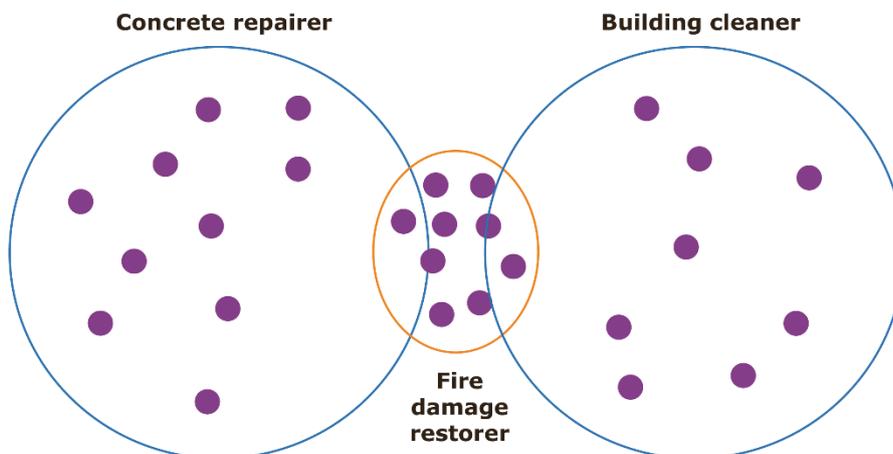
This means that an occupation in one classification is a specialisation of more than one occupations in the other one.

Example

NOC X	Mapping type relation	ESCO v1
Asphalt spreader	More specific than	Civil engineering worker
Asphalt spreader	More specific than	Road construction worker



Explanation of the example: An asphalt spreader in NOC X is 'more specific than' a civil construction worker, as well as 'more specific than' a road construction worker in ESCO v1. In fact, the asphalt spreader occupation covers a subset of jobs of the civil engineering worker, as well as a subset of jobs of the road construction worker. This logically implies that civil engineering worker and road construction worker overlap in terms of scope. If this was not the case, it would not be possible to establish broader-narrower relations between these occupations and the only relation possible would be a 'close match'. The reason is illustrated in the following image:



In the case above, the concrete repairer occupation only covers some of the jobs within the scope of the fire damage restorer (e.g. some jobs are specialised). The case holds true for the building cleaner as well.

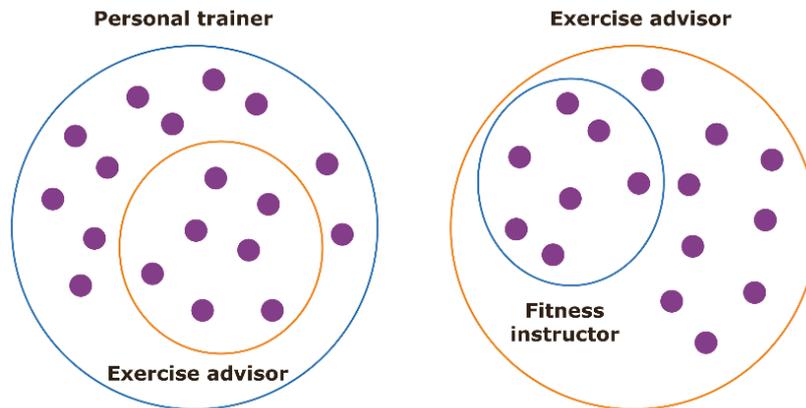
Case 5: Combination of 'more general than' and 'more specific than' mapping relations

This means that an occupation in one classification can have both broader and narrower³² relations to different occupations in the other classification.

³² Occupations in ESCO are described at different levels of abstraction, depending on the language used and requirements of the labour market. However, these may differ between groups of countries.

Example

NOC X	Mapping type relation	ESCO v1
Exercise advisor	More specific than	Personal trainer
Exercise advisor	More general than	Fitness instructor



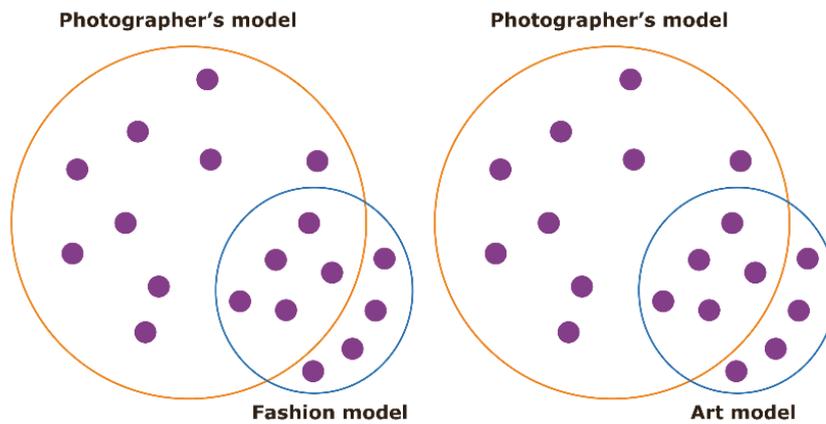
Explanation of the example: An exercise advisor in NOC X is 'more specific than' a personal trainer in ESCO v1. In fact, the exercise advisor occupation only covers a subset of the jobs within the scope of the personal trainer (and all the jobs within the scope of the exercise advisor are within scope of the personal trainer as well). Based on the same reasoning, the exercise advisor is 'more general than' a fitness instructor in ESCO v1.

5.4.3.2 Criteria and rules for establishing a 'close match'

Case description: There may be cases where two occupations are similar to the extent that a set of jobs is included within the scope of both of them. However, these occupations also include jobs that are mutually exclusive (within the scope of one occupation, but out of the scope of the other). In this case, a broader-narrower relation cannot be established. As a result, a mapper should establish a 'close match'.

Example 1

NOC X	Mapping type relation	ESCO v1
Photographer's model	Close match	Fashion model
Photographer's model	Close match	Art model

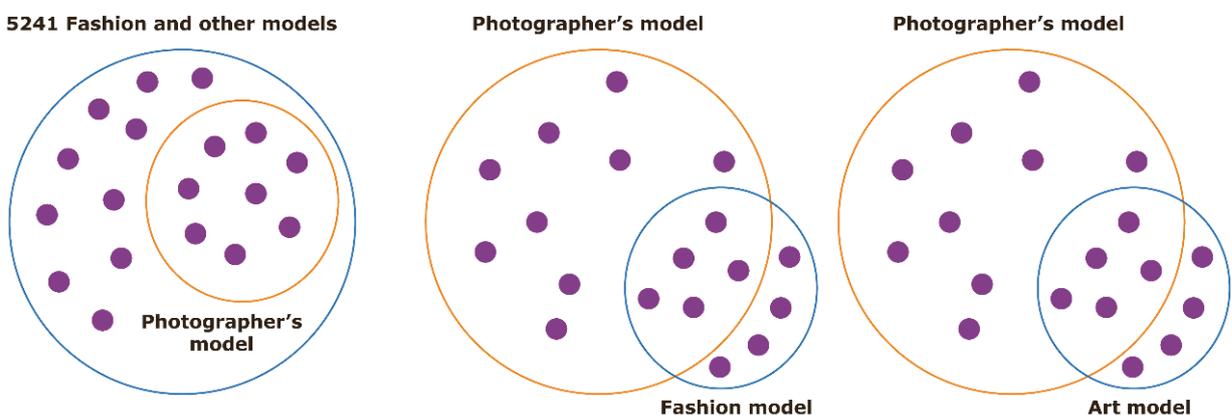


Explanation of the example: In the example above, the fashion model and art model are occupations in ESCO v1. In NOC X, the photographer's model occupation describes a model that only works with photographers.

Some jobs within the scope of the ESCO occupations are also within scope of the photographer's model in NOC X (e.g. a fashion model could specialise in posing for photographers). However, the photographer's model occupation also includes jobs that have nothing to do with fashion (and therefore are not within scope of the fashion model). The same reasoning can be applied to the art model. In this case, a 'close match' is the correct choice.

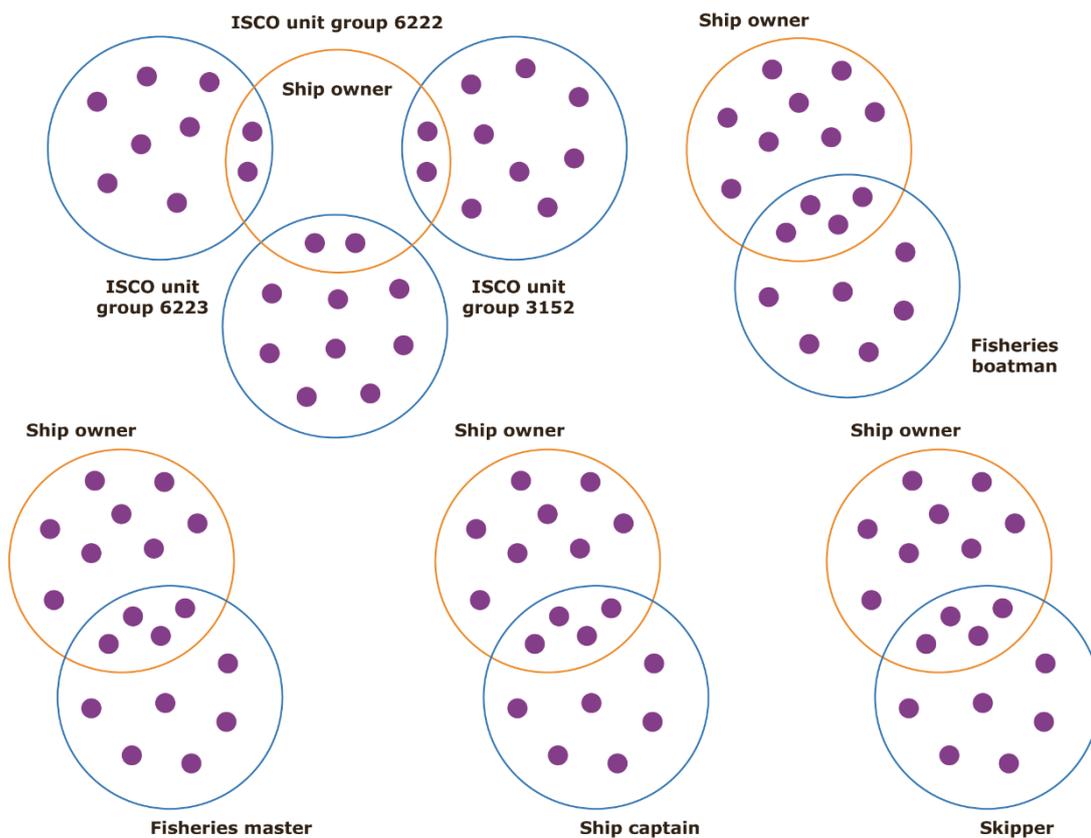
It is important to notice that when an occupation in NOC X is mapped to an ESCO occupation as a 'close match', part of its scope remains virtually unmapped. In order to mitigate this shortcoming, mappers should always combine this relation type with a 'more general than' or 'more specific than' relation type (as displayed below), either with a broader ESCO occupation or with an ISCO unit group.

NOC X	Mapping type relation	ESCO v1
Photographer's model	Close match	Fashion model
Photographer's model	Close match	Art model
Photographer's model	More specific than	ISCO unit group: 5241 Fashion and other models



Example 2

NOC X	Mapping type relation	ESCO v1
Ship owner	More specific than	ISCO unit groups: 6222, 6223, 3152
Ship owner	Close match	Fisheries boatman
Ship owner	Close match	Fisheries master
Ship owner	Close match	Ship captain
Ship owner	Close match	Skipper



Explanation of the example: The ship owner occupation in NOC X captures jobs that involve the ownership of a ship. Jobs involving ship-ownership can be found in ESCO v1 in the fisheries boatman, fisheries master, ship captain and skipper occupations. However, these occupations have a much broader scope (cover many more jobs) and cannot be considered an 'exact match' to a ship owner, but a 'close match' instead.

Also in this case, to make sure that all the jobs in scope of this occupation are mapped to ESCO, the mapper should create 'more general than' and/or 'more specific than' relations either to a broader occupation or to an ISCO unit group. In this case, the ship owner can be mapped as 'more specific than' the ISCO unit groups indicated in the table in Example 2.

As a side note, it is important to notice that the ship owner occupation does not fit the definition of an occupation used in ESCO. Therefore, it is not considered an occupation

in ESCO. In fact, ownership of a ship does not necessarily imply that the ship is used for work (or is related to specific tasks and duties).

5.4.3.3 How to map a compound occupation concept

Case description: Occupational classifications often include compound occupations that, in their title, combine two or more terms that refer to different sets of tasks and duties (that can be thought of as different occupations). In fact, these are so interrelated that they are typically combined, but could also be found separately in the labour market (e.g. health and safety engineer).

Case 1: One or more components (e.g. safety engineer) of the NOC compound occupation exist in ESCO

If one or more components of the NOC compound occupation (ESCO v1 does not contain compound occupations) exist in ESCO, the first thing to do is to assess its scope.

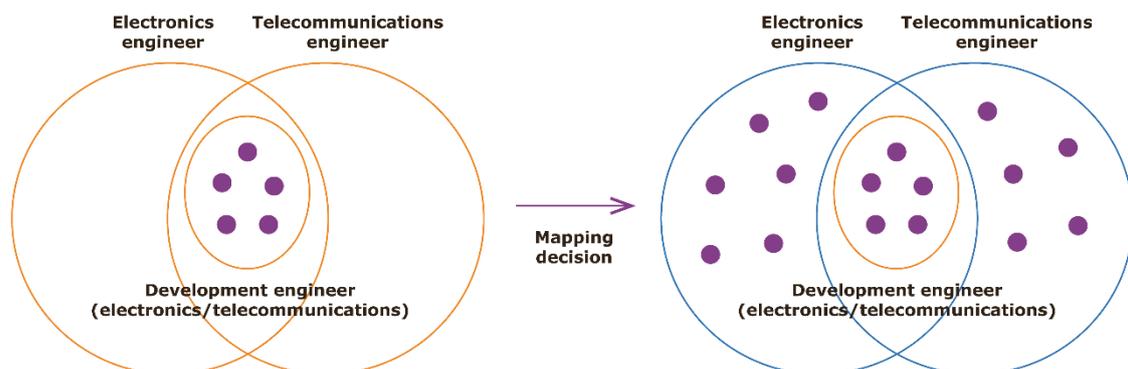
The scope should be determined in relation to the other NOC occupations. In fact, the mapper should check which of the following situations applies:

1. One or more NOC occupations include one or more components of the compound NOC occupation being assessed;
2. There is no other NOC occupation that includes one or more components of the compound NOC occupation being analysed.

This is illustrated with two examples with the development engineer (electronics /telecommunications) occupation.

Example of situation 1

NOC X	Mapping type relation	ESCO v1
Development engineer (electronics/ ³³ telecommunications)	More specific than	Electronics engineer
Development engineer (electronics/telecommunications)	More specific than	Telecommunications engineer

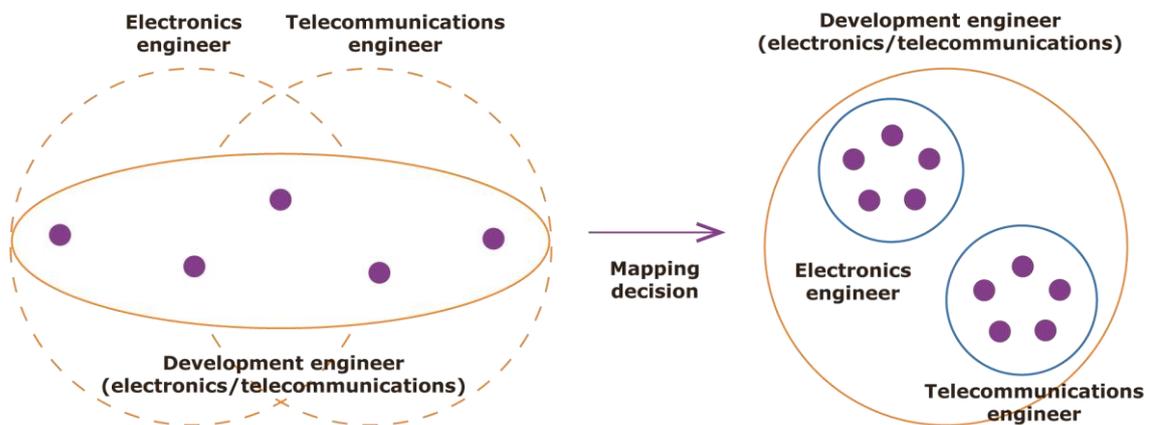


³³ The '/' symbol means 'and'.

Explanation of the example: If the electronics engineer and/or telecommunication engineer occupations exist in the NOC as separate occupations, development engineer (electronics/ telecommunications) is at the intersection and therefore 'more specific than' the ESCO electronics engineer and telecommunications engineer occupations.

Example of situation 2

NOC X	Mapping type relation	ESCO v1
Development engineer (electronics/telecommunications)	More general than	Electronics engineer
Development engineer (electronics/telecommunications)	More general than	Telecommunications engineer

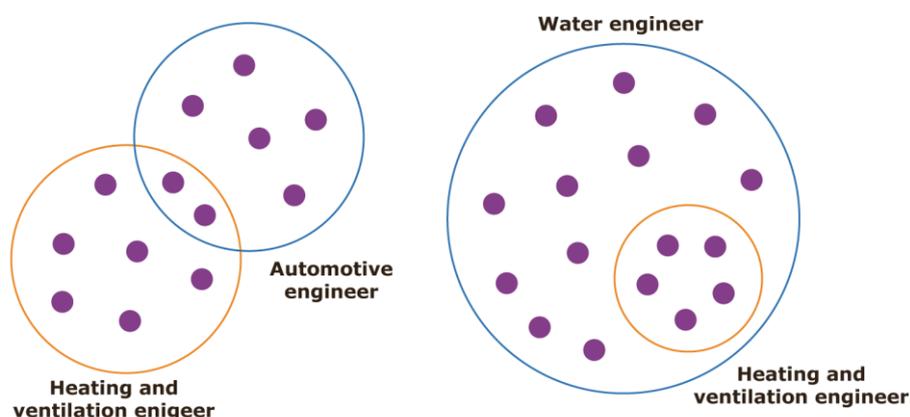


Explanation of the example: If the electronics engineer and telecommunication engineer occupations do not exist in the NOC as separate occupations, development engineer (electronics /telecommunications) can be considered to cover both fields of telecommunications and electronics and is 'more general than' the ESCO occupations electronics engineer and telecommunications engineer.

Case 2: The components of the compound occupation concept in NOC X do not exist as a separate occupation in ESCO

Example

NOC X	Mapping type relation	ESCO v1
Heating and ventilation engineer	Close match	Automotive engineer
Heating and ventilation engineer	More specific than	Water engineer



Explanation of the example: If none of the components of the compound occupation concept in NOC X exist as a separate occupation in ESCO, then the mapper should look for a 'close match' (image 1), a 'more general than' relation type (image 2) or a 'more specific than' relation type with an occupation in ESCO. As stated before, a 'close match' always requires at least one 'more general than' or one 'more specific than' relation type.

5.4.3.4 Deciding among various mapping candidates

Case description: There might be cases where several 'more general than' and 'more specific than' relations could be established between a NOC occupation and ESCO occupations.

Some of these relations, while semantically correct, may not reflect the evidence from the labour market.

Example

NOC X	Mapping type relation	ESCO v1
Director of the National Library	More specific than	Library manager

OR

NOC X	Mapping type relation	ESCO v1
Director of the National Library	More specific than	Public administration manager

Explanation of the example: The mapper could establish a 'more specific than' relation type between the Director of the National Library occupation and the library manager and public administration manager occupations. In order to be as accurate as possible, when faced with more than one option, the mapper should reflect on aspects like:

- the career path of the NOC occupation (e.g. do you need to be a public administration manager in order to evolve to Director of the National Library? Is there any mobility between the two occupations?);
- the similarity in knowledge, skills and competences (e.g. do the occupations share tasks that require similar skills and competences?).

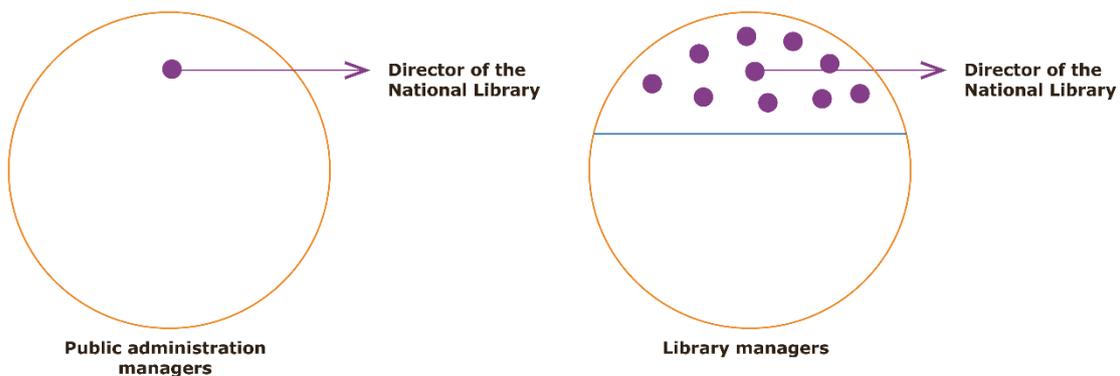
A reflection could take into consideration:

- the number of public administration managers that typically become Directors of the National Library, against the number of library managers that typically become Directors of the National Library;
- the similarity (or difference) between the tasks of a Director of the National Library and the tasks of the other two occupations in ESCO.

The mapper then could conclude that the percentage of public administration managers who become Directors of National Library is far smaller than the percentage of the library managers; thus the latter is more relevant. As a result, it is more adequate to map as follows.

Example

NOC X	Mapping type relation	ESCO v1
Director of the National Library	More specific than	Library manager



5.4.3.5 Additional ambiguous cases of a general nature and their resolution

Case 1: An occupation in the NOC does not have an equivalent occupation in ESCO v1 and vice versa

In this case, the mapper should search in the skills pillar for relevant skills that reflect the occupation they are looking for. The skills should help them to find the relevant occupation(s), but if that is not the case then the mapper should map to the relevant ISCO unit group.

In fact, depending on the tool used to carry out the mapping effort, the semantic similarity may not be sufficient to find the right correspondence for a NOC occupation in ESCO.

For example, the NOC labourer occupation does not have any corresponding similar terms in ESCO (in ESCO this term is considered to be too general and therefore is avoided). However, looking at the skills related to this occupation in the NOC reveals that this occupation involves the following skills:

- Clean equipment;
- Supply machine with appropriate tools;
- Pack and store goods;
- Request delivery of raw materials.

This set of skills in ESCO is related to the factory hand occupation. Therefore, this could be the best candidate occupation to map to.

Case 2: A mapping pair of occupations belongs to different ISCO unit groups (this covers all types of relations, i.e. exact match, broader, narrower and close match)

The mapping to ISCO is not a binding element in the mapping process between ESCO and a NOC. However, since ESCO is mapped to ISCO and NOCs typically are too, ISCO is extremely valuable when it comes to comparing subsets of the classifications (e.g. per ISCO unit group) and finding the most appropriate candidate occupation to map to. Therefore, while ISCO can greatly facilitate mapping occupations, it should not block mappers from establishing a mapping relation if the best candidate occupation to map to is located in a different ISCO unit group.

Example

NOC X	ISCO-08 relation
Overnight customer care manager	4224 Hotel receptionists

ESCO v1	ISCO-08 relation
Night auditor	4226 Receptionists (general)

In the example above, the overnight customer care manager occupation should be mapped to night auditor even if they are related to different ISCO-08 unit groups.



Note: Mappers should record all these cases and flag them up to the Commission through the ESCO helpdesk at the end of the mapping project. The ESCO team will then review the respective ISCO mappings and consult the ILO.

Case 3: A NOC includes levels (e.g. junior, senior)

ESCO v1 avoids levelling in occupations. These should be considered as specialisations linked to a more general ESCO occupation. Therefore, mappers should map the NOC occupation as 'more specific than' the (more general) ESCO v1 occupation.

Example

NOC X	Mapping type relation	ESCO v1
Senior firefighter	More specific than	Firefighter

Case 4: Mapping a concept in a NOC to a combination of an occupation and skills in ESCO v1

Example 1 (incorrect mapping)

NOC X	Mapping type relation	ESCO v1	Combined with ESCO skill
Java developer	Exact match	Software developer	Java

The solution illustrated in the table above is incorrect and should not be implemented. An occupation concept in a NOC should not be mapped to a combination of an occupation and skill in ESCO and vice versa. The mapping platform does not enable this kind of mapping. The correct mapping for this case should instead be implemented as follows.

Example 2 (correct mapping)

NOC X	Mapping type relation	ESCO v1
Java developer	More specific than	Software developer



Note: This is not an exhaustive list. It will be enriched with the outcomes from future mapping projects. In case you come across other cases, please contact the ESCO helpdesk at EMPL-ESCO-SECRETARIAT@ec.europa.eu.

5.4.4 Examples of skills mapping cases and how to treat them

'Establish mapping relations between skills' means that mappers will create relations between skills in ESCO v1 and equivalent types of concepts in their NSCs (e.g. work activities). This means that for each concept in one classification, mappers should indicate the corresponding concept(s) in the other classification. The section below lists mapping cases and how to treat them. They are based on the skills mapping pilot between ESCO v1 and NSCs.

5.4.4.1 Concepts to map

The ESCO skills include knowledge, skills and competences that are defined as follows³⁴:

- **Knowledge:** The body of facts, principles, theories and practices that is related to a field of work or study. Knowledge is described as theoretical and/or factual, and is the outcome of the assimilation of information through learning.
- **Skill:** The ability to apply knowledge and use know-how to complete tasks and solve problems. Skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).
- **Competence:** The proven ability to use knowledge, skills and personal, social and/or methodological abilities in work or study situations, and in professional and personal development.

Knowledge concepts in ESCO are formulated with a simple statement of the name of the knowledge area or body of information.

Conversely, skills and competences start with an action verb (e.g. 'use', 'operate', 'manage' and 'analyse'). They describe the ability to **apply** knowledge and know-how. Therefore, the use of action verbs helps to clarify the level of expertise and autonomy expected for carrying out tasks in particular contexts.

It is important to keep these definitions in mind before undertaking the mapping of NSC skills to ESCO skills.

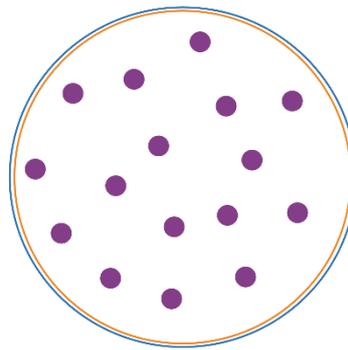
5.4.4.2 The skills to be mapped have the same scope

Case description: The most straightforward case when mapping a NSC X skill to an ESCO skill is when their scope is exactly the same.

Example

NSC X	Mapping type relation	ESCO v1
Develop teamwork schedule	Exact match	Plan teamwork

³⁴ Source: Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning
<https://ec.europa.eu/ploteus/sites/eac-efq/files/en.pdf>



Develop teamwork schedule
Plan teamwork

Explanation of the example: Even though the titles of the two skills are not exactly the same, they are almost perfect synonyms. But most importantly, the skills encompass the ability to apply the same knowledge and know-how to complete similar tasks and problems.

5.4.4.3 A skill concept in one classification is far less granular than related skill concepts in the other classification

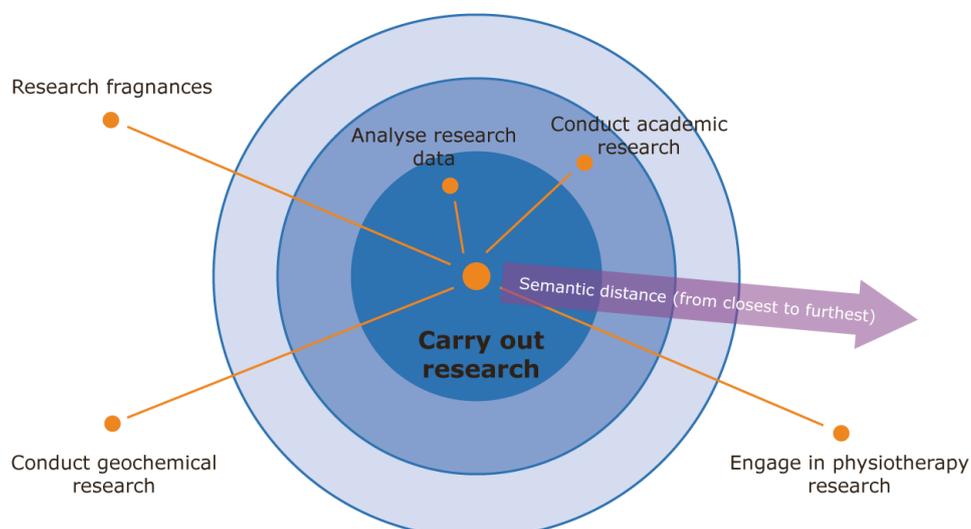
Case description: There will be cases where a skill concept in a NSC or ESCO is far less granular than related skill concepts in the other classification. In this case, the mapper can approach the mapping task in one of the following ways:

- Search for skill concepts that are relatively 'close' (in meaning) and establish a mapping relation;
- If there is no reasonably 'close' concept, establish no mapping relation.

The following examples and diagrams illustrate the meaning of 'close' and 'far' in this context.

Example 1

NSC X	Mapping type relation	ESCO v1
Carry out research	More general than	Analyse research data

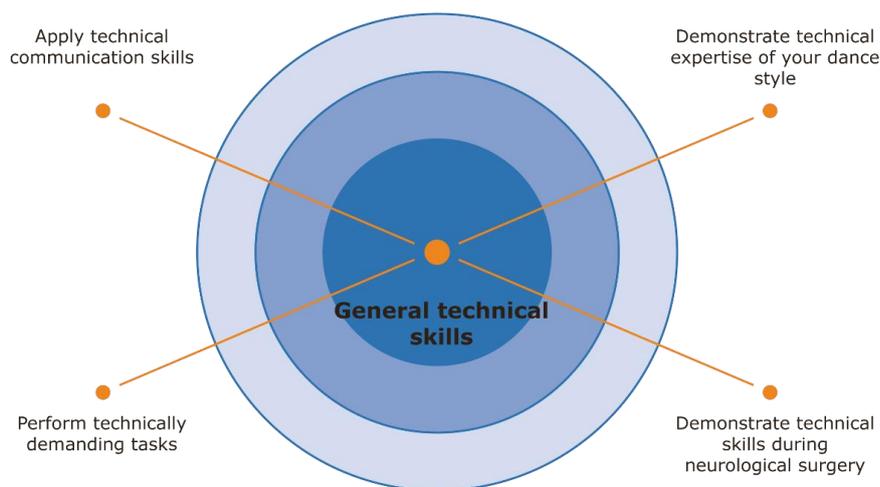


Explanation of the example: The skill concept carry out research is a broad concept that can be mapped as 'more general than' to analyse research data. While there are other concepts that could have been mapped, they should not be because their meaning is too far from the meaning of the original concept. The image above illustrates this concept of semantic distance.

For example, engaging in physiotherapy research is objectively a specialisation of carry out research, but if such a relation is established then the same relation would have to be established for all the other research specialisations. This may lead to numerous (even 50+) mapping relations, which would produce undesired results and subsequently introduce further 'noise'. This would decrease the effectiveness of document exchanges (CVs and job vacancies) in the context of EURES. The high number of relations would also increase the effort and cost of maintaining the mapping tables.

Example 2

NSC X	Mapping type relation	ESCO v1
General technical skills	Too generic to be mapped	



Explanation of the example: The general technical skills concept is too abstract to be mapped to any skill concept in the other classification. The word 'general' widens the broadness of technical skills even more. As displayed in the diagram above, general technical skills in ESCO are distributed across a wide range of sectoral economic activities and transversal³⁵ skills that are too 'far' from the nature of general technical skills.

5.4.4.4 How to map a compound skill concept

Case description: NSC classifications often include compound skills that combine, in their title, two or more terms capturing knowledge areas and skills that are typically

³⁵ Transversal knowledge, skills and competences are relevant to a broad range of occupations and economic sectors. For more information and examples, you can visit the ESCO portal: https://ec.europa.eu/esco/portal/escopedia/Transversal_knowledge%252C_skills_and_competences

combined (e.g. health and safety, videography and animation and talent retention and training). When faced with a compound skill in a NSC, the same methodology described for the compound occupations applies.

Case 1: One or more components of the NSC X compound skill exist in ESCO

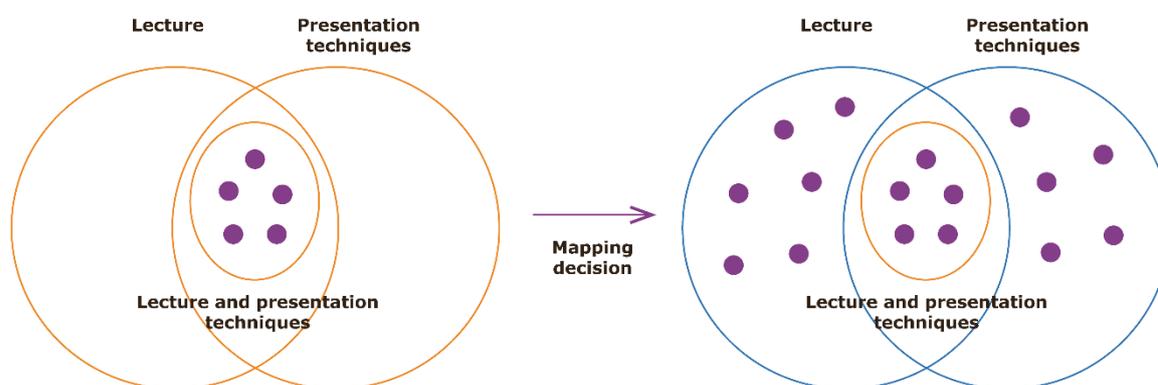
If one or more components of the NSC X compound skill (ESCO v1 does not contain compound skills) exist in ESCO, the first thing to do is to assess its scope. The scope should be determined in relation to the other NSC X skills. In fact, the mapper should check which of the following situations applies:

1. One or more NSC X skills include one or more components of the compound NSC X skill being assessed;
2. There is no other NSC X skill that includes one or more components of the compound NSC X skill being analysed.

This is illustrated in the examples below.

Example 1

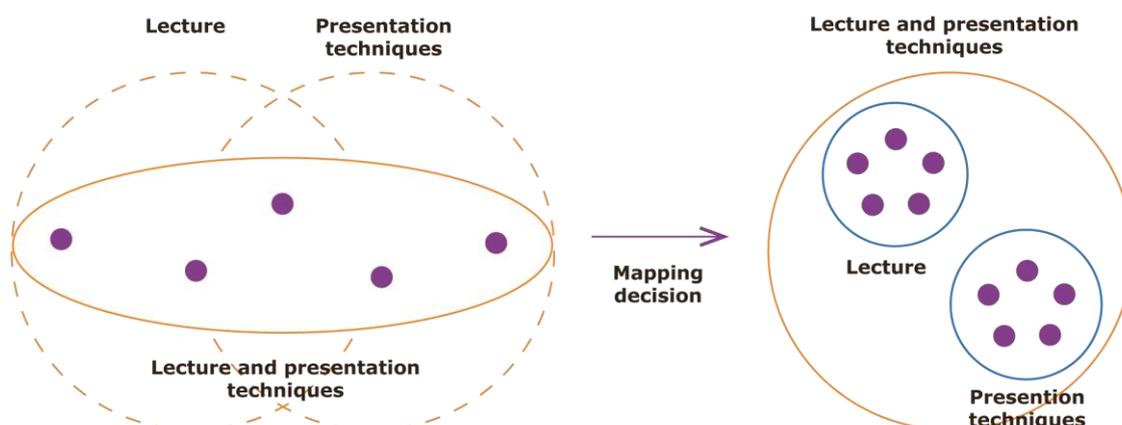
NSC X	Mapping type relation	ESCO v1
Lecture and presentation techniques	More specific than	Presentation techniques
Lecture and presentation techniques	More general than	Lecture



Explanation of the example: If the lecture and presentation techniques skills exist in the NSC X as separate knowledge concepts, lecture and presentation techniques is at the intersection and therefore 'more specific than' the ESCO lecture and presentation techniques skills.

Example 2

NSC X	Mapping type relation	ESCO v1
Lecture and presentation techniques	More general than	Presentation techniques
Lecture and presentation techniques	More general than	Lectures



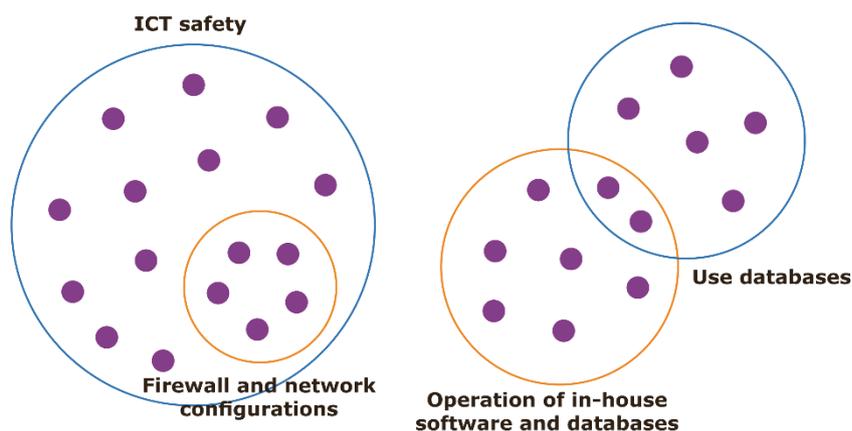
Explanation of the example: If the lecture and presentation techniques skills do not exist in the NSC X as separate knowledge concepts, lecture and presentation techniques can be considered to cover both areas of lecture and presentation and is therefore 'more general than' the concept lecture and the concept presentation techniques.

Case 2: The components of the compound skill concept in NSC X do not exist as a separate skill in ESCO or they exist but are described:

- using a different skill type (e.g. the NOC X is described as a skill or a competence, while in ESCO the closest candidate to map to is a knowledge concept or vice versa);
- using a different action verb (this is especially relevant if the action verbs convey the idea of different levels of complexity and autonomy).

Example

NOC X	Mapping type relation	ESCO v1
Firewall and network configurations	More specific than	ICT safety
Operation of in-house software and databases	Close match	Use databases



Explanation of the example: If none of the components of the compound skill concept in NOC X exist as a separate skill in ESCO, then the mapper should look for a 'more general than', a 'more specific than' (image 1) or a 'close match' (image 2) relation type with a skill or a knowledge concept in ESCO. While, in the case of occupations, a 'close match' always requires at least one 'more general than' or one 'more specific than' relation type, this is not necessary when mapping skills and knowledge. As previously mentioned, i) a skill in ESCO does not necessarily have a broader skill and ii) there is less similarity between skill classifications than there is between occupational classifications.

In image 1, none of the components of the NOC X firewall and network configurations knowledge concept exist in ESCO. However, the ESCO ICT safety skill is more general and at the same time encompasses the two components of the NOC X skill.

In image 2, the NOC X skill and the ESCO skill use different action verbs: 'use' and 'operate'. 'Using' in this context describes the task of entering data into a database. Conversely, 'operating' refers to installing, maintaining and securing the corporate database software. Therefore, the two concepts, while sharing some abilities to apply knowledge and know-how, do not fully overlap (e.g. they both imply knowledge of relevant software). Therefore, mapping these concepts as 'close match' is the best solution.

If the mapper is not able to find any correspondence at all, the skill can be left unmapped.

5.4.4.5 How to work with skill hierarchies

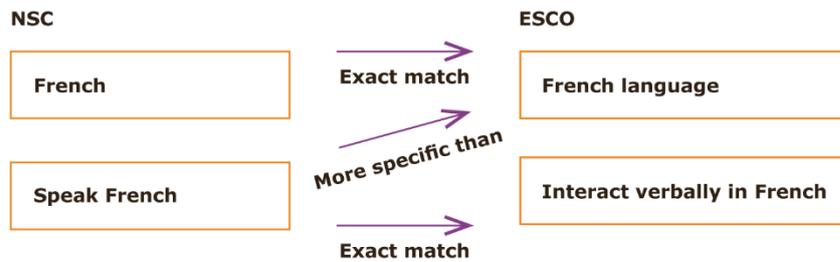
Case description: Currently ESCO has no skill hierarchy apart from the transversal skills list³⁶. In case Member States have a skill hierarchy, for reasons of precision, it is recommended to map the skills at the leaf level³⁷ of both classifications. If this is not possible, the Member States should map at the broader level.

³⁶ The Commission is currently studying potential skills hierarchies for ESCO. This work will be presented to Member States when available.

³⁷ Leaf level of a classification is the lowest level.

Example 1

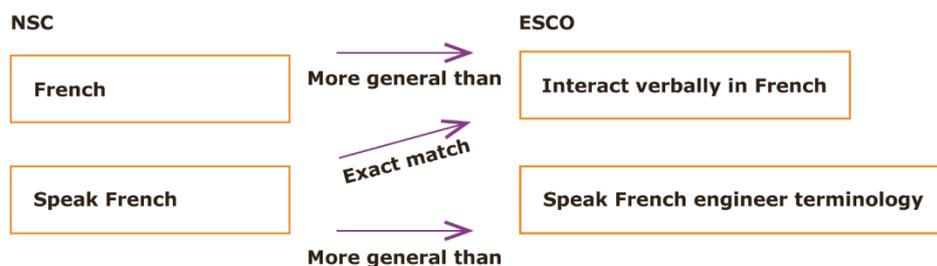
NOC X	Mapping type relation	ESCO v1
French	Exact match	French language
Speak French	More specific than	Interact verbally in French



Explanation of the example: Member States should establish the exact match relations. Implied broader and/or narrower relations will be established automatically by the software of the mapping platform.

Example 2

NOC X	Mapping type relation	ESCO v1
French	More general than	Interact verbally in French
Speak French	More general than	Speak French engineering terminology
Speak French	Exact match	Interact verbally in French



Note: In order to facilitate the understanding of this example, we have included the concept Speak French engineering terminology, which is a fictitious case and does not exist in ESCO v1.

Explanation of the example: Again, Member States should establish the exact match relation. Implied broader and/or narrower relations will be established automatically by the software of the mapping platform.

5.4.4.6 Additional ambiguous cases of a general nature and their resolution

Case	Solution
A gap in ESCO v1, e.g. I have a skill in my NSC and I cannot find it in ESCO v1.	<p>It is expected that there will be no complete mapping from one skill classification to another due to the fact that:</p> <ul style="list-style-type: none"> • unlike occupations, a skill in ESCO does not necessarily have a broader skill; • there is less similarity between skill classifications than there is between occupational classifications, which makes the skill mapping process challenging. <p>To this end, there will be skills that will remain without a mapping relation.</p> <p>While mappers should look for the equivalent pair, once they have exhausted all the possibilities and cannot find any skill in their NSC as an 'exact match', 'close match', 'more specific than' or as 'more general than' to a relevant skill in ESCO (so they are sure that there is a gap in ESCO), they can leave the concept unmapped.</p> <p>In this case, mappers should record the cases and transmit them to the Commission via the ESCO helpdesk at the end of the mapping process.</p>
A gap in a NSC, e.g. I have a skill in ESCO v1 and I cannot find it in my NSC.	<p>This will probably be a frequent case due to the fact that some Member States may not cover the entire range of ESCO skills in their skill classification (e.g. a Member State may only cover transversal skills). In this case and if any 'exact match', 'close match', 'more specific than' or as 'more general than' relation types do not seem suitable, the concept can be left unmapped.</p>
A NSC includes levels.	<p>ESCO v1 avoids levelling in skills. These should be considered as specialisations linked to more general ESCO skills. Therefore, the NSC skill should be mapped as 'more specific than' to the more general ESCO v1 skill.</p> <p>For example, the advanced Java knowledge in NSC X should be mapped as 'more specific than' the Java (computer programming) knowledge in ESCO v1.</p>
Can I map a knowledge in a NSC to a skill or competence in ESCO v1 or should it always be mapped to another knowledge concept and vice-versa?	<p>Our recommendation is, if possible, to map knowledge to knowledge and skill to skill. However, since we expect differences in the data models of the Member States, we do not make this a strict requirement.</p>
How to map transversal skill concepts (incl.	<p>Transversal skills should be treated with the same approach as the rest of the skills. If a NSC does not list</p>

language skills)?	any transversal skills, no mapping will be established.
How to map software products?	Software products that exist as separate concepts should be treated with the same approach as the rest of the skills. If a NSC does not list any software products, no mapping will be established.



Note: This is not an exhaustive list. It will be enriched with the outcomes of future mapping projects. In case you come across other cases, please contact the ESCO helpdesk at EMPL-ESCO-SECRETARIAT@ec.europa.eu

5.5 Review the mapping results

Section 5.1: Set up the teams and workflow recommended a bi-directional mapping carried out by two mapping teams. This approach is based on the four-eye principle within the framework of which two teams should validate and subsequently approve the established mapping relations before the Member State publishes them. This mechanism increases transparency and allows quality assurance of the mapping results from the very beginning of the process.

5.6 Publish the mapping tables

According to Article 5 of the Implementing Act on the adoption of technical standards and formats necessary for the operation of the automated matching [...], *'the Member States shall make their mapping tables available by publishing them on the ESCO service platform [...]*'. In an initial phase, Member States will deliver the mapping tables to the Commission services, who will publish them on the ESCO portal.

5.7 Maintain the mapping tables

Article 19(3) of the EURES Regulation stipulates that Member States will regularly update the mapping tables. In particular, this will be necessary when one of the two classification systems changes (i.e. the European classification or the NOCs/NSCs).

For updates of the European classification, the Commission services will publish release notes and files showing the difference between the new version of the European classification and the previous version ('delta files'). This ensures that only the parts of the mapping table that were affected by the update need to be reviewed. This review will be supported by explanatory notes accompanying each new release. Within the framework of the maintenance of ESCO, the Commission services foresee the following:

- **Minor releases:** These contain changes that do not affect the concept level (i.e. no concepts are added, no concepts are removed and the scope of the existing concepts is not changed). Minor releases refer to typos, adding or removing relations between concepts, making minor changes to the labels and the descriptions, etc. and do not require any update of mapping tables.

- **Major releases:** These contain changes that affect the concept level (i.e. concepts are added, concepts are removed and the scope of the existing concepts is changed).

The release of a new version of ESCO does not automatically mean that it will immediately be used as the European classification for the purpose of EURES. Procedures and methods to accommodate new versions of ESCO will be specified in the Implementing Act under Article 19(6).

While the adoption of a minor release in EURES does not have any impact on the mapping process, the adoption of a major release does. Therefore, the Commission will not adopt a new major version of ESCO in EURES until the time period that the Member States agree to allow for mapping their national classifications has expired.



Note: A new major release of ESCO, which is going to be used in EURES, needs to be adopted via a new Implementing Act.

The effort will depend on the extent of the update, how well the update is documented, the complexity of the classifications and the amount of experience on national level with mapping of classifications.

5.7.1 How often should mapping tables be updated

Mapping tables should be updated in the following cases:

- **When there is a new major release of the NOC/NSC (in the sense described above):** This means that each time Member States add a new occupation, remove a skill, etc. they will update the current mapping relations between the new or deprecated³⁸ concepts and the concepts in ESCO. Prior to that, they will review if the relation is still relevant and whether the relation type needs to be updated. Member States should make the review of the relation to ESCO part of the normal updating process of their classifications.
- **When there is a new major ESCO release (in the sense described above):** This means that each time the Commission services add new occupations in ESCO, remove skills, etc. Member States will establish new mapping relations between the new or deprecated ESCO concepts and the concepts in their NOC/NSC. As in the case above, Member States will first have to review if the relation is still relevant and whether the relation type needs to be updated.
- **When improvements and/or corrections to a mapping table are required:** In this case, the Member State will have to create a new version of the mapping table and submit it again to the Commission services for publication.

³⁸ In the world of software development, 'deprecate' refers to functions or elements that are in the process of being replaced by newer ones (<https://techterms.com/definition/deprecated>). In ESCO this word is used to refer to concepts that become obsolete and are replaced by new ones. Concepts in ESCO cannot be deleted.

6. Using ESCO as a national classification

Article 19(4) of the EURES Regulation states that 'Member States may choose to replace their national classifications with the European classification, once completed, or maintain their interoperable national classification systems'. Therefore, the Regulation gives the option to Member States to integrate ESCO directly into their systems. Member States can decide to do so for various reasons, which are outlined in Section 4: Mapping verses replacement.

Added value

ESCO allows information about job vacancies, candidate profiles, CVs, skills passports, training opportunities and career pathways to be exchanged. By facilitating these exchanges, ESCO can help to improve the matching of people to jobs, skills development and labour market intelligence. The table below lists some of the principles guiding the development of ESCO, which reflect its added value³⁹:

Useful	ESCO aims to become the de facto standard for the identification and communication of occupations, skills, competences and qualifications
Accepted	ESCO is the backbone of the interoperability system in EURES, making it the European classification advocated in the new EURES regulation. In addition to that, ESCO aims to be voluntarily adopted by key stakeholders by demonstrating its added value, ease of use and responsiveness to users' needs.
User-led	The Commission developed ESCO with the needs of users as the guiding principle.
Flexible	ESCO does not aim to standardise the scope of occupations or the learning outcomes of qualifications. Instead, it aims to provide standard terminology that can be used to describe the details of a job, the professional profile of a job seeker or the content of a learning outcome.
High quality	The Commission, together with stakeholders and external contractors, carefully ensured the quality of the research undertaken and the conclusions drawn before ESCO was published, ensuring that it corresponds accurately and meaningfully with realities in the labour market, education and training in Europe.
Involvement at national level	The Commission involves Member States in order to increase ownership of ESCO and support its use at national level.
Involvement of stakeholders	The Commission involved stakeholders, in particular social partners, in the development of ESCO and the definition of its standard terms, and will continue to do so going forward.
Reflects realities	ESCO reflects realities in the European labour market and the education and training sector.
Transparent	The development of ESCO was transparent. Work results were shared

³⁹ Based on the document 'ESCO Strategic Framework':
<https://ec.europa.eu/esco/portal/document/en/01192a20-a7c0-4d0d-b5d3-29d1f9b819c8>

and open development	with interested parties and it was open to all stakeholders.
Compatible	ESCO was developed to ensure maximum compatibility with existing IT systems and standards.
Dynamic	Over time, ESCO will adapt to changing user needs, new developments in the labour market and the education and training sector, and new technological possibilities
Free to use	ESCO is a Commission product and can be used free of charge by public and private stakeholders.

Types of services ESCO can be used for

ESCO can be used in several different areas, including job matching, education, career guidance and statistics.

- **Job matching based on skills and competences:** For successful job matching based on knowledge skills and competences, it is necessary not only to extract the relevant information from online job vacancies and CVs, but also to interpret this information in the correct way. ESCO's structure of three interlinked pillars helps IT systems to achieve this. ESCO contains a skill and competence set for each occupation and information on relevant qualifications. It enables IT systems to better understand a jobseeker's knowledge, skills and competences, based on work experience and education. In this way, ESCO helps create a more precise picture of the skills and competences of an individual. Information on both the candidate and the expectations of the employer can be compared using job-matching algorithms. As a result, people can find the job that best matches their skills and employers can find the talent they need.
- **Fostering transnational mobility:** ESCO is the European classification advocated in the new EURES Regulation. The EURES service helps those who wish to find a job abroad and offers European employers and other stakeholders a variety of services and information covering every aspect of recruiting from other European countries. By adopting ESCO as the national classification, Member States do not need to carry out the mapping exercise to comply with the EURES regulation.
- **Improving career guidance:** The skills and competences provided by ESCO facilitate the description of existing capabilities and the identification of missing skills, including transversal skills. Based on their skills profiles, users can identify their skills gaps in relation to their desired job and select learning opportunities that will address them.
- **Supporting skills intelligence and statistics:** Policy makers can use labour market statistics to better understand labour market dynamics and react to them. ESCO allows statisticians to collect, compile and disseminate data at a more detailed level than ISCO-08 (see below for more detail).

6.1 Options for Member States

There are three different approaches that a Member State can consider when it comes to adopting ESCO:

1. Building a new system using ESCO;
2. Replacing ISCO in job matching systems with ESCO;
3. Replacing a national classification with ESCO.

Section 6.3: [Technical implementation](#) describes the procedures that Member States need to follow in order to implement ESCO from a technical point of view.

6.1.1 Building a new system using ESCO

Member States with no national classification can decide to build a new system from scratch using the ESCO classification. They can benefit from the added value that ESCO brings and from the fact that it is a system managed by the Commission and available free of charge. They will therefore have no costs related to maintaining and updating the classification.

6.1.2 Replacing ISCO in job matching systems with ESCO

ESCO is classifying its data based on the structure of ISCO-08, which groups entries by education level. The two latest versions of ISCO are ISCO-88 (dating from 1988) and ISCO-08 (dating from 2008).

In ESCO, each occupation is mapped to exactly one ISCO-08 code. ISCO-08 is therefore used as a hierarchical structure for the occupations pillar. ISCO-08 provides the top four levels for the occupations pillar, while ESCO occupations are located at level five and lower.

Since ISCO is a statistical classification, its occupation groups do not overlap. Each ESCO occupation is therefore mapped to only one ISCO unit group. It follows from this structure, that ESCO occupation concepts can be equal to or more specific (narrower) than ISCO unit groups, but not more general (broader).

A few groups of ISCO-08 do not contain ESCO occupations. These are usually occupation groups with no economic activity in the EU, such as '9624 Water and firewood collectors'.

ESCO and ISCO complement each other and for this reason, the ESCO hierarchy is based on ISCO. Nevertheless, they differ in various ways. ESCO has been specifically developed to:

- facilitate job-matching between different systems;
- help in the creation of online CVs and job vacancies;
- exchange this information across borders;
- support career guidance activities like self-assessment;
- inform policy-making based on big data and occurring labour market trends, i.e. emerging skills and occupations.

On the other hand, ISCO has been developed mainly for statistical purposes. It is not necessarily the best choice to support other labour market services like precise job-matching, creation of CVs or e-profiles and skills assessment tools, instead:

- ESCO benefits from a greater data granularity, with 2,942 occupations and 13,500 skills while ISCO counts 436 occupations unit groups and no skills. The more granular and rich a system, the better it can serve the purposes described above.
- ESCO contains a very rich terminology available in all 24 EU official languages, but also in Icelandic, Norwegian and Arabic. This allows ESCO to serve other labour markets and stakeholders outside the EU. The Commission also provides the translation of ISCO in 24 languages (Icelandic, Arabic and Irish not included).
- The ESCO updating cycle is more frequent than ISCO's; a major update is foreseen approximately every three years. This means that as soon as there are new emerging skills or occupations appearing on the labour market, they can be integrated into ESCO faster than into ISCO.
- ESCO ensures backward compatibility. As ESCO is mapped to ISCO, all the historical data records (tagged with ISCO-08) can still be processed with the ESCO classification.
- ESCO gives Member States access to skills, which are not included in ISCO.

Consequently, given ESCO's granular level of information on occupations and skills, its availability in 27 languages and its relatively short update cycle, ESCO is more suitable when delivering services to end users in certain use cases such as competence-based matching, assessment tools, CVs and job vacancies creation and big data analysis, as it can deliver better results.

If Member States decide to replace ISCO with ESCO, Member States will not lose any information: full compatibility with ISCO is ensured. They can combine the use of ISCO with the more precise terminology of ESCO.

Even if Member States want to use ISCO alone, they could implement it using ESCO URIs, which would make it easier for them to move to ESCO at a later stage.

6.1.3 Replacing a national classification with ESCO

Member States can decide to replace their national classification with ESCO in the following cases:

- when the classification is outdated or not fit for purpose;
- when their national classification is not widely used;
- when their national classification does not include a lot of meta information;
- when their national classification is not linked to National Qualification Standards;
- when the costs of maintaining a national classification are higher than the costs of adopting ESCO.

6.2 Migration of historical data records

When a Member State replaces their national classifications with ESCO, the data records like job vacancies, CVs or candidate profiles that are tagged with their national classifications are not compatible with the new system.

When the documents in question have a short life cycle, this might not be an issue as the new documents will be tagged with ESCO in the new system. However, in many countries data records can have a validity of 6 to 12 months or even longer. In this case, old data records still need to be used in the new system. This data will then have to be migrated. Therefore, if Member States want to integrate ESCO within their system but still want to keep historical data, they will need to map their national classification to ESCO⁴⁰.

6.3 Technical implementation

A Member State that wants to implement ESCO can do it via the API or by downloading the classification and integrating it into their systems.

6.3.1 Integrating ESCO by using the API

ESCO can be accessed through APIs, available via the ESCO Service Platform⁴¹. The ESCO API allows the user to send http requests and it returns responses in JSON format. It offers different services such as full text search, suggest, get concept scheme, get occupation, get skill, get concept and get related resources. Two different types of APIs are offered:

- The **ESCO Web Services API**, which is already available, is designed to support interoperable machine-to-machine interaction over the internet and provides applications with access to the different versions of the ESCO classification. The ESCO Web Services API is hosted by the European Commission and is accessible through the ESCO Service Platform. The functionalities of this API cover the majority of ESCO business cases and it provides an easy-to-use web interface for linked data. In linked data, any concept is identified by a uniform resource identifier (URI). For example, the following URI identifies the textile specialised seller occupational profile: <http://data.europa.eu/esco/occupation/528f90ed-e250-48bd-aacc-ffb7b1de5654>
- The **ESCO Local API**, based on Tomcat, which can be easily installed on the user's machines and is due to be released in 2018. This will allow access to the ESCO taxonomy to be customised, any version of the ESCO classification to be chosen, and scalable solutions to meet specific performance needs to be implemented. If the user decides to install the local API, they will need to update it every time there is a major update of the classification. On average this is likely to occur every three years or so.

⁴⁰ See Section 5: Mapping methodology.

⁴¹ <https://ec.europa.eu/esco/api>

A user manual is available on the ESCO portal, which contains the necessary information needed to access the ESCO data:

https://ec.europa.eu/esco/api/doc/esco_api_doc.html

6.3.2 Downloading ESCO from the portal

ESCO is available in two different structured formats: Comma-separated values (CSV) and Terse RDF Triple Language (TURTLE).

The download section of the ESCO portal⁴² allows partial ESCO datasets to be downloaded in CSV format. This file format can be used to import data for further use in various software products, e.g. spreadsheet software or database systems. Currently, the following data subsets can be downloaded in CSV format:

- A list of occupation concepts (including occupation groups);
- A list of knowledge, skills and competences concepts (including skills/competences groups);
- Relationships between occupations and skills/competences.

The CSV file listing the relations between occupations and skills/competences concepts is mono-lingual (it only lists the URIs). The list of occupations and skills (with their metadata) is available in each language as a separate file.

The full ESCO dataset can be downloaded in TURTLE format from the ESCO Service Portal. TURTLE is a format for expressing data according to the Resource Description Framework (RDF) model.

6.4 Example of adoption of ESCO: Jobs Ireland Portal

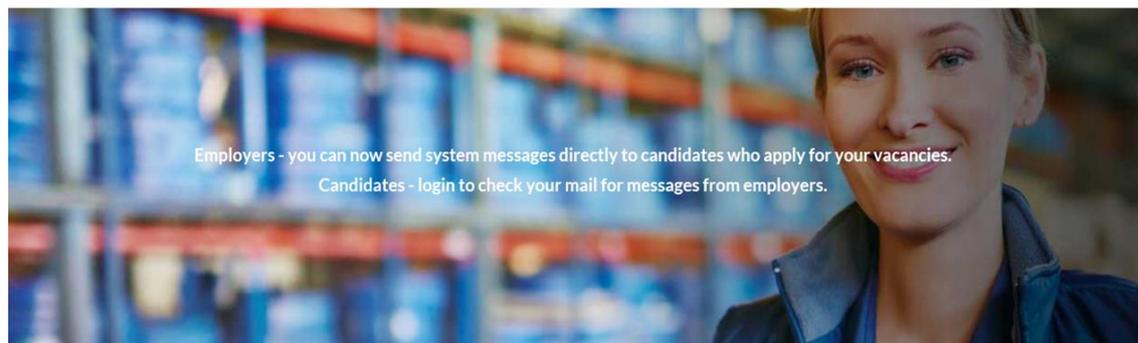
In line with Article 19 of the EURES Regulation, JobsIreland⁴³ has implemented ESCO, integrating it directly into their systems. Based on their experience of working with the classification, there are lessons learnt that can be useful to guide other stakeholders in their potential future implementation of ESCO⁴⁴. Ireland does not foresee new updates on the platform until 2022.

"ESCO enables knowledge, skills and competences requested by the employer to be automatically compared with the skills profile of candidates, allowing users to get more accurate results, even across language barriers."

⁴² <https://ec.europa.eu/esco/portal/download>

⁴³ <https://www.jobsireland.ie/>

⁴⁴ Based on feedback provided by the Irish Public employment services



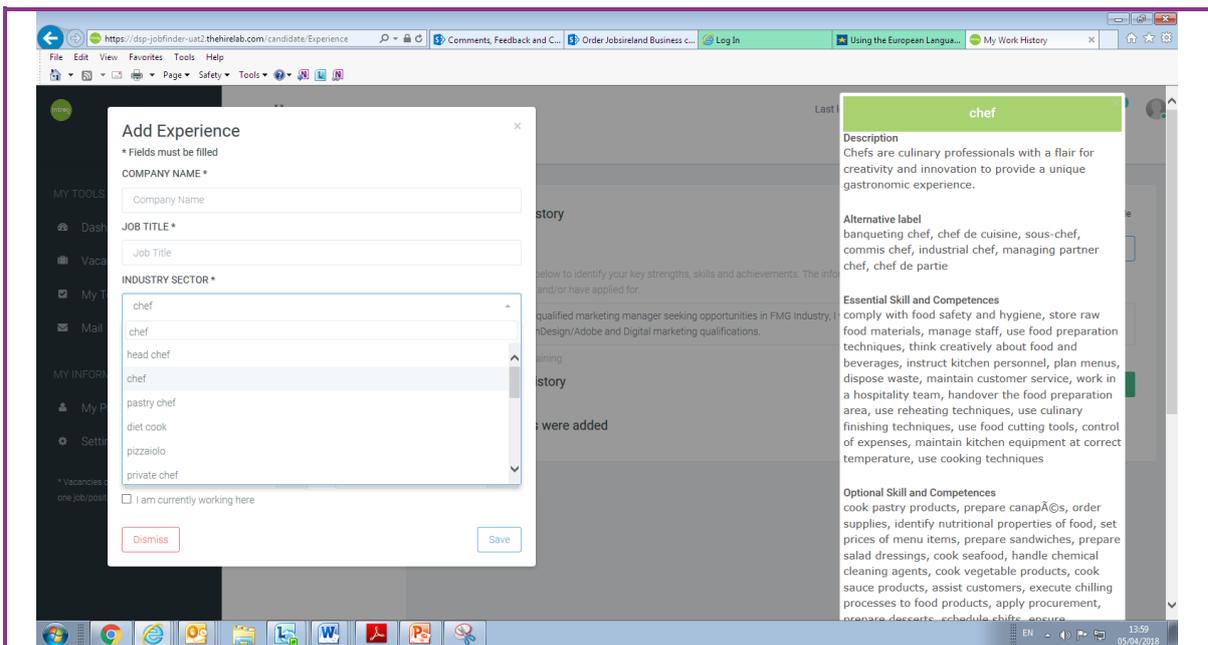
Search for your next job

The Irish PES decided to implement ESCO into their system as they thought it was the best solution both for them and their audience (candidates and employers). They were previously using ISCO-88, which did not match with the needs of the new Jobs Ireland portal (the matching was not successful).

The Irish PES contacted the Commission services to learn more about ESCO and decided to implement it. They started with ESCO v0 (pilot version), and later on implemented ESCO v1.

Benefits of ESCO for the users (employers and candidates)

- There is an expanded occupation list: Alternative labels increase the chances of getting a better match;
- It has easy-to-read descriptions of occupations;
- The details of the knowledge and skills required are outlined in the interface;
- No mapping is required;
- No training is required – it is simple to use and understand;
- Once implemented, no further work is needed;
- It can help candidates to view requirements for other occupations (e.g. the skills and competencies required);
- When the qualifications pillar is completed, it will provide a very useful tool for career guidance.



View of the Jobs Ireland Portal

Benefits of the interface for the users

- It has a predictive text interface;
- There is a drop down selection – best match order;
- Selection returns factsheets, as seen on <https://ec.europa.eu/esco/portal/occupation>;
- It helps candidates make informed decisions and brings precision to the occupation selection process;
- It enhances the list of occupations through the addition of alternate labels.

To implement ESCO, the Irish PES made use of the ESCO Local API.

The move to ESCO v0 meant that the PES had to map the existing ISCO list to the rather larger ESCO list. ESCO v0 contained 4,805 occupation categories whereas ISCO had only 408 occupation categories. This meant updating the closed and live vacancies with the new ESCO classification overnight and from then on, the PES rendered using a predictive text option for new vacancies.

The Commission services provided technical support via conference calls, which allowed all these issues to be addressed. They were also taken into account when drafting this manual⁴⁵.

⁴⁵ ESCO v0 (and later ESCO v1) was mapped to the latest version of ISCO (ISCO-08), while the Irish PES were still using the older version, ISCO-88.

Annex I: Glossary of terms

Term	Explanation
Mapping	<p>It refers to the process of creating a correspondence table between two classifications. As part of the process, which can be assisted by software tools, an expert identifies corresponding concepts in the two classifications and records a relationship (mapping) between them⁴⁶.</p> <p>Mapping can also be done between two versions of the same classification, in which case the correspondence tables describe the detailed changes that have taken place in the revision process.</p>
Tagging	<p>Tagging is the process of adding labels to a document or file. This can be done using a classification (e.g. a vacancy for a car mechanic gets tagged with the label 'car mechanic'). Now a software can recognise the category this vacancy belongs to, facilitating its match to a CV.</p>
Linking	<p>Two taxonomies are linked to each other when their concepts have relations between them other than a correspondence or translation.</p> <p>For instance, stating that an occupation in one classification equals a profession in another one is an example of mapping concepts. Saying that the occupation of car mechanic is typically working with cars is an example of linking two concepts.</p>
Taxonomy alignment	<p>When two taxonomies are aligned, this means that mapping is available between their concepts. This mapping – in its simplest form – consists of a mapping table.</p>
Mapping table	<p>A table that lists the concepts of one classification and the corresponding ones in the other.</p>

⁴⁶ https://ec.europa.eu/esco/portal/escopedia/Mapping_to_ESCO

