ESCO version 1.2: scope, prioritisation of the different new elements and technical aspects MAI 35-04

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European Skills, Competences, Qualifications and Occupations

1. Background

ESCO needs to contribute to the improvement of the labour market's functioning, its bridging to education and training. It also needs to contribute to an integrated digital labour market based on open, correct and well-structured data and on communication across languages, domains and use cases. For these reasons, the Commission is analysing ESCO's sustainability beyond version 1.1, especially with regards to its taxonomy model and the role of AI technology therein.

In this context, the Commission has identified a number of possible new elements to be added in ESCO, following version 1.1. These elements are related to the level of granularity and sectoral coverage of ESCO, the consistent assignment of skills to occupation and the contextualisation of skills. The following paragraphs list these elements in more detail.

2. Scope and elements of ESCO 1.2

a. Relations between skills and occupations

Establishing links between occupations and skills is one of ESCO's biggest assets and an element that qualifies it against other international standards. Ensuring consistencies in how the relations between skills and occupations are built and creating a clean model that can be replied in each update cycle is therefore crucial to improve the quality of ESCO.

However, it has been noted that the relations between ESCO occupations and skills are not always consistent. Occupations belonging to certain sectors (e.g. social services) display high numbers of essential and optional skills and knowledge, while in other cases the total number of related concepts does not exceed 15.

On the other hand, some skills are linked to a very low number of occupations or in some cases to none. The content update process demonstrated how a skill generated in a given context could be potentially linked to many occupations and this is particularly the case for green and digital competences which are more and more demanded across sectors.

The analysis of online vacancies by applying artificial intelligence built on ESCO can provide an answer to these challenges. It can provide valuable intelligence on the skills needed in different jobs, thus allowing to match emerging skills with occupations and improve those occupations which lack sufficient skills. This approach was tested during the update cycle of ESCO version 1.1, giving promising results.

b. Tasks vs skills

The quality review of the ESCO skills pillar allowed to identify several concepts that are too detailed and do not fully match the definition of skill[1] used in ESCO but rather express concrete tasks performed in a working environment.

This problem could be addressed by adding a third element to the ESCO data model, introducing the notion of task alongside skills and knowledge concepts. To this end, it would be needed to reach a consensus on a definition of "task" that will be used to

[1] 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". They can be 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).

identify and tag all concepts which do not express a skill but rather a work activity or procedure.

c. Levelling

Different stakeholders have expressed their interest in having "levels" added to ESCO skills; however the term "levels" can have different interpretations. Firstly, there is levelling in terms of mastery, where people with different seniority for the same occupation require different skills. A similar distinction is often made when it comes to the size of an organisation: a large organisation might require different skills for the same occupation compared to an SME or the scope of the occupation can be different.

At the same time, there is the levelling of skills themselves: the same skill can be exercised at different levels of mastery, which cannot currently be expressed neither with ESCO concepts nor their attributes.

Finally, levelling also refers to "level of detail". The first version of ESCO has been developed by a varied network of sectoral reference groups. This led to a difference in level of detail between the different sectors. Some sectors are over or underrepresented in terms of number of occupations. Similarly, some occupations have very detailed skills and knowledge concepts linked to them while others have a more transversal character.

Not every interpretation of levelling can be implemented through the existing system of essential and optional skills. The Commission is further analysing these challenges to come up with an approach to increase consistency across the classification and thus improve its interoperability.

d. Contextualisation of transversal skills

Transversal skills, sometimes referred to as soft skills, are general skills that are relevant across all occupations and sectors. Because of this broad applicability, the Commission decided not to link transversal skills with occupations in order to avoid repetition of skills in all occupations.

From a practical point of view however, it is important for implementers and their end users that each transversal skill can be contextualised[2] so that it gets a more specific meaning in the context of a given occupation. For example "attend to detail" in the context of a bricklayer in practice means something different than in the context of a specialized doctor.

The Commission will analyse different scenarios to address this clear need that will result in ESCO being more practical to implement.

e. Results of the mapping exercise

The process of mapping national classifications of occupations and skills (when existing) to ESCO in the framework of the EURES regulation will end in August 2021. Member States will provide the Commission with correspondence (mapping) tables showing which concept from the national classification corresponds to an ESCO concept, and to which degree.

[2] Skill contextualisation is a method to create knowledge or skill and competence concepts by analysing how transversal skills, competences or knowledge are applied in the specific context of a sector or an occupation. This allows bringing transversal knowledge, skills and competences which are rather abstract to a more detailed level so that they can be directly used in occupational profiles. Available at: https://ec.europa.eu/esco/portal/escopedia/Skill_contextualisation

Mapping tables will be published on the ESCO portal and will be available for consultation. In addition to this, the Commission is currently reflecting on the best way to add this information (individual matches) into the ESCO data model. For example, language versions of ESCO could be enriched by showing the correspondence between an ESCO occupation (or skill) to a concept in the national classification of the country using that particular language. In addition, the mapping tables are an excellent source of information to detect gaps in the ESCO classification.

f. Towards a labour market knowledge graph

"Searching" (and job matching) has changed intensively in the past decade, from looking up keywords to browsing ever more connected information as more data is organised and structured continuously.

One of the core problems in developing these systems is related to the searching and understanding of text. Nowadays, the typical approach to address this problem is to follow a hybrid approach that combines machine learning methods with knowledge represented via managed classifications or knowledge graphs. For example, LinkedIn built a knowledge graph containing millions of entities, including companies, skills and occupations while covering multiple languages[3]. CareerBuilder and Burning Glass Technologies maintain semantic knowledge graphs and skills and occupations taxonomies to analyse labour market data[4,5].

Building these taxonomies and knowledge graphs from scratch is a significant challenge and therefore existing publicly available data are often used. For instance, the online freelancing platform Upwork is building a proprietary ontology and partially relies on Wikipedia entities[6]. For their Cloud Jobs API, Google enhanced the O*NET Standard Occupational Classification[7]. In general, leveraging knowledge that is carefully created by labour market experts and made publicly available by organisations as O*NET and ESCO, has the important benefit of guaranteeing a stable structure as compared to a purely data-driven approach. Starting from a validated and well-understood taxonomy and further enriching and applying it via data science technology can be a successful approach.

ESCO has the same ambition to grow into a connected knowledge graph of data and metadata, to work in concert with other instruments for enhancing interoperability in the labour market and in education and training. The choice to build ESCO on linked open data principles illustrates that this ambition was there already from the beginning.

Currently the ESCO classification consists of entities such as skills, occupations, skills and occupation groups, and of course the varied relations between these entities. For ESCO to evolve and reap the benefits of a more advanced knowledge graph, it needs to be connected with other entities and enriched with new metadata. On the short and medium term, the Commission is considering links with other classifications such as O*Net and other national classifications in Europe. In terms of additional metadata, examples are proficiency levels and relevance of skills for occupations, salaries, demand

[3] https://engineering.linkedin.com/blog/2016/10/building-the-linkedin-knowledge-graph
[4] https://www.computer.org/csdl/proceedings-article/dsaa/2016/07796928/12OmNxy4N3M
[5] https://www.burning-glass.com/research-project/skills-taxonomy/
[6] https://medium.com/upwork-datascience/data-machine-learning-and-marketplace-optimization-at-upwork-part-1-user-level-growth-2065150373ef
[7] https://cloud.google.com/blog/products/gcp/cloud-jobs-api-machine-learning-goes-to-work-on-job-search-and-discovery

and supply of occupations/skills, similarity between skills and between occupations, and tagging skills and occupations as green or digital.

3. Conclusions

The Commission invites the input of the MAI on all the above issues, with the goal of prioritising those elements which could be covered in the next version of ESCO (ESCO v1.2). A workshop dedicated to the conceptual challenges for the next ESCO version will take place during the 35th ESCO MAI and will offer an opportunity for a first discussion around these issues. Based on the results of the workshop, the Commission might invite the written input of the MAI on a number of specific challenges.