



Blueprint “New Skills Agenda Steel”: Industry-driven sustainable European Steel Skills Agenda and Strategy (ESSA)

Sector Skill-Set Matrix

Deliverable D4.3

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1. Introduction

This report provides the background required to use D4.4 (Skill-Set Matrix). It explains the functions of the Matrix and introduces and explains key categories utilised for conceptualising it. Considering the iterative development of the matrix, the outline provided here will be refined and integrated on the basis of the inputs coming from other WPs of the project and from the fieldwork.

In the sections below are outlined the three main functions that the matrix intends to fulfill and the EU frameworks and tools it makes reference to.

2. Function 1: Mapping the ‘Europeanisation’ of national VET systems

One function of the skills matrix is to provide an overview to which extent skill provision in the five case study countries have been affected by European-level initiatives to harmonise VET provisions and VET documentations. Due to fairly low levels of worker mobility with regards to steel production-related jobs, such a functionality is useful mainly for those interested in the harmonisation of VET provisions and accreditations at EU level. It is currently unclear to what extent steel companies themselves have an interest in Europeanisation. Given the widespread belief that skilled workers are generally in short supply across the continent, it is conceivable that increased worker mobility through European harmonisation has negative effects at least on some players in the European steel industry.

As mentioned above, the matrix considers a range of EU-level programmes, resources and initiatives and cross-checks their availability or implementation in the member states under consideration (five case study countries).

- *European Qualifications Framework (EQF)*¹: The European Qualification Framework aims at supporting transparency and making educational and vocational qualifications more comparable across the EU countries. EQF works as a meta-framework based on learning outcomes (proved by the possession of specific knowledge, skills and abilities) and articulated in 8 progressive levels, from basic general knowledge to advanced knowledge of a field of work or study. It allows the mapping of the qualifications issued in the member states, ensuring transparency and supporting mobility. The EC recommends in particular that the member states use EQF to reference national qualifications frameworks and to compare all types and levels of qualifications in the Union that are part of national qualifications frameworks; take measures so that all qualification documents newly issued by the competent authorities contain a clear reference to the appropriate EQF level; encourage the use of EQF by social partners, public employment

¹ For a more extensive review of the framework and initiatives mentioned see Deliverable 4.2 - Analysis of cross-European VET frameworks and standards for sector skills recognition.

services, education providers, quality assurance bodies and public authorities to support the comparison of qualifications and the transparency of learning outcomes.

- *European Skills, Competences, Qualifications and Occupations (ESCO) database*: ESCO works as a dictionary, describing, identifying and classifying professional occupations, skills, and qualifications relevant to the EU labour market and education and training. The main aim of the system is to support workers' mobility across the EU and a more integrated labour market by offering a common understanding on skills, occupations and qualifications. The ESCO database helps users to understand: a) the set of knowledge and skills related with a specific occupation; b) the knowledge, skills and competences related with a specific qualification; c) the qualifications related with a specific occupation. Thus, ESCO is based on three pillars, qualifications, skills and occupations, that are interrelated with each other. The qualifications pillar collect data about the formal qualifications delivered in the EU countries. The ESCO occupations pillar is made of the ESCO occupations profiles and the related ISCO-08 hierarchies (ISCO-08 provides the top four levels of the hierarchy, while ESCO provides the fifth and more specific level). A direct link between an occupation and a relevant qualification can be displayed in ESCO only if this is established at the national level. In other cases, such relationships are indirect through the skills pillar. ESCO makes also use of other cross-European frameworks such as EQF, ISCED-F 2013 and the Digital Competences Framework (DigComp).
- *International Standard Classification of Education (ISCED)*: ISCED framework was developed to provide a common framework for cross-national classification and statistical analysis of Education systems. ISCED classifies education programmes using two main variables: levels of education and fields of education. The basic units of the classification are the national education programmes and the related educational qualifications. ISCED defines an education programme as a set or sequence of educational activities or communication designed and organized to achieve pre-determined learning objectives or accomplish a specific set of educational tasks over a sustained period. A qualification is consequently intended as the official confirmation (in the form of a certificate) of the successful completion of an education programme. ISCED maps the links between education programmes and qualifications. The levels on which ISCED is structured reflect the degree of complexity and specialization of the content of an education programme, from foundational to complex, from 0 to 8. The levels are associated with the duration of education programmes and achievements. Under the ISCED general classification also falls ISCED Fields of Education and Training (ISCED-F), which classifies education programmes and qualifications by field of study, where a field is intended as a broad domain, branch or area of content covered by an education programme or qualification. The classification is structured in three hierarchical levels, from the first level (broad), that encompasses 11 fields, to the second (narrow), that includes 29 fields, to the third (detailed) made of 80 fields. The third level is intended mainly for use at the tertiary level of education and for vocational education and train-

ing programmes and qualifications at secondary and post-secondary, non-tertiary levels. The grouping of programmes and qualifications into broad, narrow and detailed fields is based on the similarity of the subject matter. Two programmes or qualifications are recognised as belonging to the same field where the main subjects studied are the same or are sufficiently similar. The degree of similarity of the subject matter is established through the following criteria: theoretical knowledge content, purpose of learning, objects of interest, methods and techniques, tools and equipment.

- *International Standard Classification of Occupations (ISCO)*: ISCO is a four-level classification of occupations which are sorted into 10 “major groups”, 43 “sub-major groups”, 130 “minor groups” and 436 “unit groups”. The occupations’ categorization is based on the skill level and skill specialization required. Skill level is intended as a function of the complexity and range of tasks to be performed, while skill specialization is considered in terms of the field of knowledge required, the materials, tools and machinery used, the type of goods and services produced. Within ISCO, the dimension of skill level is applied mainly at the level of major group, while the other three levels are sorted mainly on the basis of skill specialization. The ISCO classification provides a framework for comparable (statistical) data across different countries. Each group is univocally identified by a title, a numerical code, and a description that explains the essential tasks and duties of the grouped occupations. Each of the 436 unit groups in ISCO-08 is made up of occupations with a high degree of similarity from the point of view of skills level and skills specialization.
- *Europass*: Europass is a portfolio, available in 27 European languages, made up of different tools devised to help individuals to communicate their skills, qualifications and experience using standardised documents templates. The documents of which Europass is composed are the Curriculum Vitae, the Language Passport, the Certificate Supplement, the Diploma Supplement and the Mobility record. The portfolio has a threefold objective, to help citizens communicate their skills and qualifications effectively when looking for a job or training, to help employers understand the skills and qualifications of the workforce, and to help education and training authorities define and communicate the content of curricula.
- *Digital Competences Framework (DigComp)*: DigComp provides a general and shared understanding of what digital competences are and entail, offering also an up-to-date vocabulary specific for the sector. It allows for the standardisation of initiatives in education and training at local or national level in reference to a common EU framework. In such a way, DigComp provides guidance and structure to all those initiatives that deal with teaching digital competences and defines an EU-wide benchmark for the sector. It identifies 5 strategic areas (namely, information and data literacy, communication and collaboration, digital content creation, safety, and problem solving) which are in turn broken down into related subdimensions. The framework is based on four proficiency levels, namely foundation, intermediate, advanced and highly specialised. The

four levels are split into two each, for a total number of eight, that can help to trace a more detailed description of progression criteria, where each of the eight levels represents a further progression of the individual in three different domains, acquisition of knowledge of the competence, complexity of the task to handle, autonomy in completing the task.

3. Function 2: Informing the Strategy for Delivering Future Skill Needs

Another function of the skills matrix is to link future skill needs (FSN) that are either task-, job-, qualification- or unspecific to the ‘best’ avenue in any specific context (mainly ‘national level’ but could be regional) to deliver the missing skills to those who need them.

For this to be useful, it is crucial work out:

- the specificity of future skill needs;
- (the inclusivity of) the available training avenues in the five case study countries;
- the practical implications of the various training avenues (their pros and cons/ pull and push factors, barriers and enablers etc., such as ‘how long does it take to establish a training programme’ or ‘who is going to pay for it’) to make judgements about suitable or even best courses of actions to close skills gaps.

As it is unlikely that there are solutions to the skill needs problem that have solely positive effects, it is not possible to derive quasi-mechanically at ‘the best solution’. Instead, careful judgements will have to be made whether one VET route is more or less suitable to deliver the required skills than another. For example, it might be the case that cyber security skills, which transcend tasks and jobs through their generality, are best delivered at the I-VET or even pre-VET stage, but that this, while desirable, is practically problematic because it might take years of ardent negotiations to be implemented and rolled-out or because it would create effects (such as, for example, higher remuneration levels for apprentices due to the upskilling of a formal qualification) that some key players might not find acceptable or desirable.

3.1 Specificity of future skill needs

Drawing on WP3 output, we can assume that future skill needs are very diverse with regard to their specificity or generalisability: while the workers of the future might need to be able to control very unique devices or to repair highly specialised machines, they will also need so-called transversal skills such as awareness of cyber security, or an ability to work efficiently in teams, or the ability to quickly learn and understand about new issues. Thus, specificity here refers to the degree of generalisability of future skill needs with the spectrum ranging from ‘transversal’ to ‘task-specific’ skills.

ESCO utilises a useful classification of skills according to their ‘reusability’, i.e. they distinguish between forms of skills with regard to how widely they are applicable. ESCO distinguishes between 4 levels:

1. Transversal
2. Cross-Sectoral
3. Sector-specific
4. Occupation-specific

Taking work done in ESSA WP3 into account, we could add a fifth level of specificity to that list:

5. Job/Task-Specific skills

The challenge for the ESSA project and WP3 and WP4 is that WP3’s starting point is exclusively situated at the Job/Task level. The fundamental problem is that each and every skill – whether they are transversal, cross-sectoral, sector-specific or occupation-specific – is ultimately related to a job or a task. The challenge becomes immediately clear once realising that while all skills are in one way or another ‘job- or task-specific’, only a sub-set of them will belong to the other four skill type categories respectively. The challenge for WP3 and WP4 is to analyse the future skill needs at task level and allocate them, if appropriate, to one of the other four categories. This is important because once one shifts perspective from job-specific (and therefore often idiosyncratic) skill needs (WP3) to skill provisions (WP4) and, more specifically, skill provision systems (VET systems) that serve collectives, the individual approach that serves WP3 well is neither practical nor effective for WP4².

3.2 Types of Skills

As an EU funded project, ESSA adopts as much as possible the definitions and terminology suggested by the relevant European institutions dealing with qualifications and skills development. Here we adopt the Cedefop definition of skills as the ‘ability to apply knowledge and use know-how to compete tasks and solve problems.’³

ESCO defines *transversal skills* as ‘relevant to a broad range of occupations and sectors. They are also often referred to as *core skills*, *basic skills* or *soft skills*, the cornerstone for the personal development of an individual. Transversal knowledge, skills and competences are the building blocks for the development of the "hard" skills and competences required to succeed on the labour market.’⁴ Examples of transversal skills are ‘the ability to work in teams’, ‘the ability to

² In a world without any constraints it would be possible to train every worker individually in accordance to the job-specified skill needs identified by WP3 which would solve the skill needs issue at the heart of ESSA. The problem is, however, that such an approach is not practically feasible for many reasons (with the extraordinary costs involved just one of them).

³ <https://www.cedefop.europa.eu/en/events-and-projects/projects/validation-non-formal-and-informal-learning/european-inventory/european-inventory-glossary#S>

⁴ https://ec.europa.eu/esco/portal/escopedia/Cross-sector_skills_and_competences

use office software such as word and excel’, ‘the ability to communicate clearly’, ‘the ability to negotiate compromise’ and so on.

Cross-sectoral skills, according to ESCO, ‘are of growing importance all over Europe. They are relevant to occupations across several economic sectors’ (a relevant example here could be the ability to ‘read’ technical drawings or the maintenance of technical systems or devices). *Sector-specific skills* are specific to a particular sector but are relevant for more than one occupation within that sector. *Occupation-specific skills* are usually applied only within one occupation and its specialisms.

As mentioned above, we could go down to the level of *task- or job-specific skills* and define them as skills, competences and knowledge that is found in some practical incarnations of specific occupations (furnace operator as an occupation but within it, operating EAF or BOF are relevant specialisations).

With regard to skill types and their relationship to each other, two analytic observations can be made that become relevant in the context of actual routes of skill provisions that will be discussed later: first, we can differentiate between transversal skills which are effectively ‘general’ (in the sense that their usefulness or applicability is not limited to a particular domain, sector, occupation or task) and what we might call domain-specific skills which relate to specific technical or professional areas in which these skills can be applied. The specific areas of skill application can vary in their width and range from whole domains, i.e. areas that span different sectors, to highly specified tasks. Second, we can observe a unidirectional, transitive relationship between the four domain-specific skill types: all of the skills that can be categorised as ‘cross-sectoral’ are, logically, also sector-, occupation- and task-specific but occupation-specific skills are not necessarily sector-specific or cross-sectoral skill.

Based on the foregoing, we can make two analytic distinctions that will prove useful later on: first, we can differentiate between transversal skills which are effectively ‘general’, ‘basic’ or ‘domain-independent’ (in the sense that their usefulness or applicability is not limited to a particular domain, sector, occupation or task) and what we might call domain-specific skills which relate to specific technical or professional areas in which these skills can be applied. To illustrate, the ability to read, as an example of a classic transversal skill, is useful for all sorts of life situations such as reading a manual of a specialised tool or figuring out the opening times of a restaurant, while the ability to repair an industrial pump is useful in very specific situations such as if one has maintenance responsibilities for industrial water circuits. The specific areas of skill application can vary in their width and range from whole domains, i.e. areas that span different sectors, to highly specialised tasks that are specific to particular or even unique jobs.

Second, we can observe a unidirectional transitive relationship between the four domain-specific skill types: all of the skills that can be categorised as ‘cross-sectoral’ are, logically, also sector-, occupation- and task-specific but occupation-specific skills are not necessarily sector-specific or cross-sectoral skills. This is important with regard to the matrix below that correlates skill types with routes of skill provisions: the transitivity in the relationship means that while all skill types can be transmitted via the most specific route (modules or courses at C-VET stage), it would not make sense to transmit entirely task-specific skills through the most inclusive routes.

Figure 1 - Skill Types according to ESCO

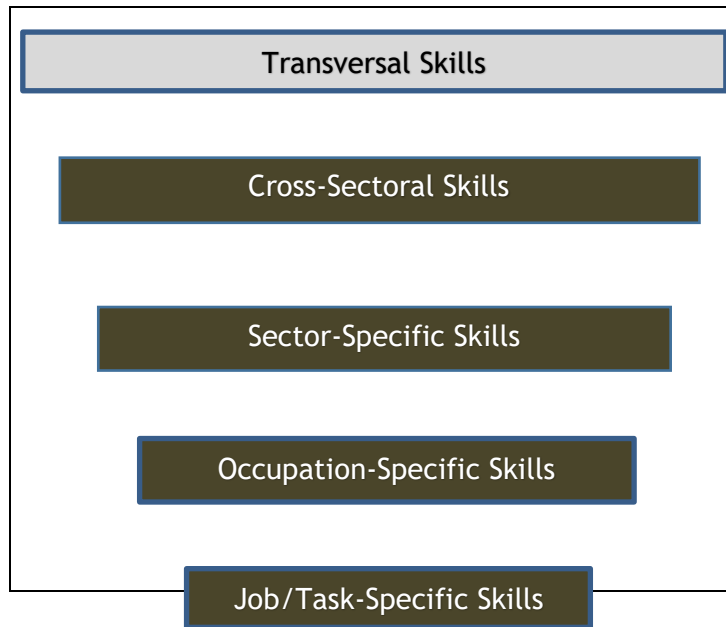
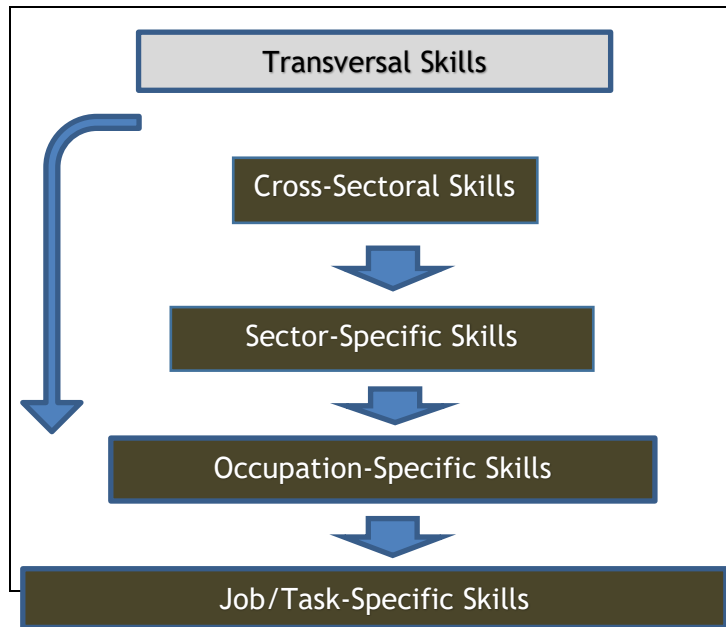


Figure 2 - Interrelationship of Skill Types



3.3 Routes for Skills Provision

WP3 identifies the future skill needs related to jobs in steel production, which is an essential aspect of future proofing the production-focused workforce in the European steel industry. The other side of the coin is to figure out how to best to transmit the required skills to the prospective

and existing workers in the steel industry. Based on the work done for D4.1⁵ we can distinguish different formal routes through which (prospective) steel workers can gain relevant skills: Pre-VET, VET-Prep, I-VET and C-VET.

One central aspect of this, which is the concern of WP4, is to identify and describe the main formal avenues or routes of skills provision in the five case study countries. Put differently, one of our main tasks is to explore the different formal options for skill transmission provided by the respective VET systems in the case study countries. Of particular interest at this stage of the analysis is what we call the *degree of inclusivity* of the various skills provision routes. This is a purely quantitative criterion that crudely establishes the relative number and the relative diversity⁶ of people (potentially) passing through the different routes. This relative (and crude) measurement is interesting in this context (it adds to the two analytic observations introduced further above) because the degree of inclusivity is inversely related to the degree of specificity with regard to content that is transmitted, which provides an interesting and valuable link between skill types and skill provision avenues that is. It informs the following crude heuristics: the more inclusive a skills provision route, the less domain-specific should the educational content be.

By *Pre-VET*, we mean any formal compulsory education that precedes VET at primary and secondary level; this effectively means formal school education. While not directly part of a country's VET system, the pre-VET stage is nonetheless extremely important because it provides the educational basis upon which VET provisions build. The crucial aspect of interest here is the inclusivity of this educational stage. Given that in all European countries school education is compulsory to varying degrees, this also means that it reaches virtually every citizen. In particular, it is an educational phase that appears to be very suitable for the initial development of many transversal skills.

By *VET-prep* or VET preparation, we mean the provisions that link compulsory school-based education with formal VET provisions. The educational provisions at this stage are mainly designed to close any skill, knowledge or competence gaps that affect those who have only completed the minimum length of compulsory school-based education. As such, it only serves a relatively small population. Moreover, explicit VET-preparation programmes do not exist in many European countries and is therefore not a generalisable feature of European VET systems. It is, however, included to provide a full picture of options.

The *I-Vet* or *initial VET* route is one of the centrally important avenues for skill provisions as it usually leads to the award of a formal occupational qualification. We can distinguish between basic, intermediate and advanced I-VET provisions: as the labelling indicates, primary I-VET provisions lead to the first formal VET qualification that prospective workers gain – typically in the form of an apprenticeship – while secondary I-VET provisions are qualifications that necessarily build on primary I-VET credentials. A good example is the German 'Meister' (master) certificate, which requires not only a primary I-VET qualification but also a certain amount of work experience.

⁵ Identification of National (Sector) VET Qualification and Skills (Regulatory) Frameworks for Steel.

⁶ With regard to belonging to domains of specialisms.

By *C-VET*⁷ or *continuous VET*, we mean training activities that take place after the I-VET stage. While C-VET provisions are usually certified or formally documented, they do not result in new occupational qualifications.

3.4 A theoretical skill-type/skill-provision-route matrix

Based on the analysis of skill types with regard to specificity and of skill provision routes with regard to inclusivity, we can derive a theoretical matrix that indicates which routes appear suitable for the provision of which skills. The matrix is ‘theoretical’ as the third element described above – the considerations of how the skill provision routes work in practice in the five case study countries respectively – is still missing. It is also theoretical in the sense that it is not (yet) based on empirical research but rather reflects the current intuitions of the WP4 team.

Table 1 - Theoretical skill-type/skill-provision-route matrix

	Pre-VET	VET_prep	I-VET ⁸	C-VET
Transversal	X	X	X	X
Cross-Sectoral	(X)	(X)	X	X
Sector-Specific		(X)	X	X
Occupation-Specific			X	X
Job/Task-Specific			(X)	X

The matrix lists the identified skill types vertically on the left and the different routes for skill provision on the top. It utilises three different colours – red, yellow and green – to indicate the suitability of a particular route for the transmission of the different skill types. Red indicates unsuitability, while green indicates suitability. The fields in yellow reflect uncertainty about suitability of a route or just limited suitability.

The matrix indicates that transversal skills, which have been characterised as universal or domain-independent above, could be transmitted through any of the mentioned skill-provision routes, including formal school education. This is warranted as these skills are not just useful for work-related purposes, but they are often necessary to navigate life *per se* in modern and

⁷ Continuing education and training: Education or training after initial education and training - or after entry into working life, aimed at helping individuals to:

- improve or update their knowledge and/or skills;
- acquire new competences for a career move or retraining;
- continue their personal or professional development.

Comment: continuing education and training is part of lifelong learning and may encompass any kind of education (general, specialised or vocational, formal or non-formal, etc.). It is crucial for employability of individuals.

Source: Cedefop, 2004

⁸ Primary and secondary IVET

complex societies.⁹ It is likely that some transversal skills are more fundamental or important than others in the sense that one requires the possession of some transversal skills to acquire other transversal skills. For example, the ability to communicate fluently in a natural language is fundamental to the acquisition of all sorts of other transversal skills.¹⁰

Moving on to the skill types that are related to specific domains, the most inclusive type are cross-sectoral skills while job- or task-specific are potentially the most ‘niche’ of skills which potentially only very few people will have to master. Put more generally, the matrix is guided by the principle that the fewer people require a particular skill the less general the provision route can be¹¹.

4. Function 3: Translating Job Profiles into Occupational Qualifications

Another function that the Matrix will fulfil is to systematically link job profiles to occupational qualification programmes, i.e. apprenticeships programmes, across the five case study countries as far as this is possible and feasible.

This functionality is an inherent effect of the division of labour between and the different foci of WP3 and WP4. Whether such a functionality is practically useful beyond the needs to be established during field work. A potential use is for HR managers in companies who might need to assess the equivalence of occupational qualifications across Europe in case they hire workers who have received their qualifications elsewhere. Having an overview of steel-sector relevant occupational qualifications should also be of use to those who want to drive forward European initiatives to improve the quality and relevance of steel-sector relevant I-VET programmes.

⁹ Collins and Evans (2007) Rethinking Expertise.

¹⁰ A research question here is whether there is an established hierarchy of transversal skills (on the type of Maslow’s needs hierarchy) – school curricula already reflect this so there must be working theories.

¹¹ To operationalise the matrix further and to make it more practically relevant requires further input from WP3 which will not become available until the end of January 2020 at the earliest.